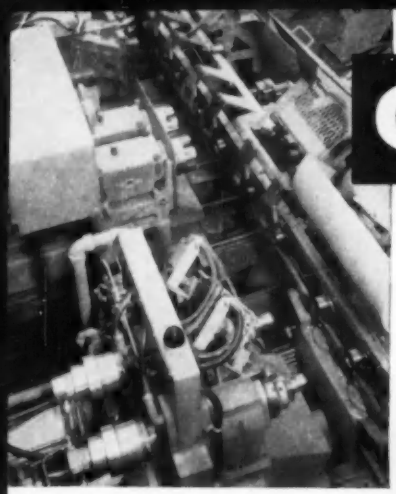
AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

DECEMBER 15, 1957

In This Issue

A CHILTON PUBLICATION



Q Where does Heald automation BEGIN

... and where does it END?

A *Wherever you want— from rough casting to finished part!*

THE EXTENT to which you apply automation in your plant is largely a matter of production economics. But whether your automated lineup consists of two stations or twenty, Heald can do the whole job from start to finish.

Perhaps, like some other men in metalworking management, you look upon Heald Bore-Matics as strictly high-precision machines that couldn't (or shouldn't) be used for *roughing* operations. Actually, Heald Bore-Matics can be and have been designed most successfully, to provide whatever degree of precision you need—from drilling, reaming, tapping, slotting, rough boring, turning and facing, etc., to any combination of precision-finishing operations.

To precision specialists roughing operations present no problems and, of course, the precision operations are taken in stride.

On any automated job, make it Heald all the way—from rough casting to precision-finished part.

It PAYS to come to Heald for the completely automated job

HEALD®

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

This 7-station Heald Bore-Matic performs 35 operations on a drum and sleeve assembly in a fully automatic cycle, as follows:

Sta. 1. Drill 6 angular holes and 2 opposed holes in hub.

Sta. 2. Bore, face, turn and chamfer 8 surfaces on flange and hub.

Sta. 3. Turn and face 9 different flange surfaces.

Sta. 4. Face 2 spots on flange.

Sta. 5. Bore, face and groove 5 different surfaces in hub and flange.

Sta. 6. Insert bronze bushing in inside hub.

Sta. 7. Finish bore bushing and finish turn hub.

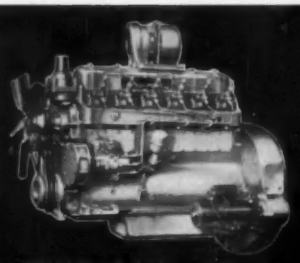
OVER THE ROAD... or OFF THE HIGHWAY

- fast
- smooth
- powerful

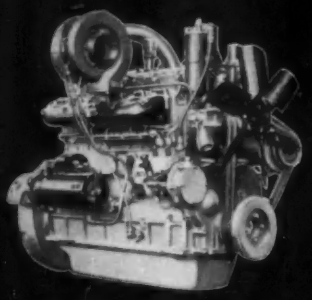
MODEL	Cyl.	*Features	Bore and Stroke	Displ. Cu. In.	Max. Torque @ RPM	Max. HP	RPM
TURBO-SUPERCHARGED DIESELS							
197-DLCS	6	ATV	4 x4	302	275-1800	131	2800
135-DKBS	6	ACTV	4¼x5	426	400-1800	185	2800
148-DKBS	6	ACTV	5¼x6	779	706-1800	280	2100
WAKDBS	6	ACTV	6¼x6½	1197	1062-1600	352	1800
NORMAL DIESELS							
180-DLC	4	AC	3½x3¾	144	102-1800	45	2400
185-DLC	6	A	3½x3¾	216	152-1000	60	2400
190-DLCA	6	AC	3¾x4	265	191-1400	84	2800
195-DLCA	6	AC	4 x4	302	221-1800	98	2800
197-DLC	6	AV	4 x4	302	216-1600	91	2800
135-DKB	6	ACV	4¼x5	426	328-1600	147	2800
148-DKB	6	ACV	5¼x6	779	584-1000	200	2100
WAKDB	6	ACV	6¼x6½	1197	845-1000	258	1800
GASOLINE							
180-GLB	4	AC	3½x3¾	144	118-1600	45	2400
185-GLB	6	A	3½x3¾	216	176-1400	67	2400
190-GLB	6	A	3¾x4	265	223-1200	77	2400
195-GKA	6	ACV	4⅛x4	320	244-1400	122	3000†
MZA	6	A	4¼x4¾	404	289-1000	128	2800†
135-GKB	6	ACV	4¼x5	426	337-1200	147	2800†
135-GZB	6	ACV	4⅜x5	451	354-1200	153	2800†
140-GKB	6	ACV	4½x5½	525	426-800	177	2600†
140-GZB	6	ACV	4⅝x5½	554	453-800	188	2600†
145-GKB	6	ACV	5¼x6	779	594-1000	240	2400†
145-GZB	6	ACV	5⅜x6	817	652-1200	260	2400†
WAKB	6	ACV	6¼x6½	1197	997-1000	280	1800

***FEATURES:** A—Aluminum Alloy Pistons; C—Counterbalanced Crankshaft; T—Turbo-Supercharged; V—Vibration Dampener.

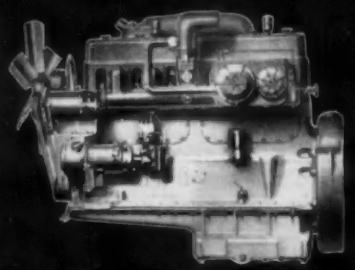
†These engines rated at higher hp and rpm for fire engine service. *Send for Bulletin 1079 for LPG ratings and complete listing of engine hp and speed ratings.*



197-DLCS—Turbocharged Diesel
(Also normally aspirated)



135-DKBS—Turbocharged Diesel
(Also normally aspirated)



WAKB—Equipped for butane

WAUKESHA ENGINES

NORMAL and TURBOCHARGED DIESELS
...GASOLINE...LP GAS
Standard or Counterbalanced Crankshafts

361

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WAUKESHA MOTOR COMPANY
Waukesha, Wisconsin
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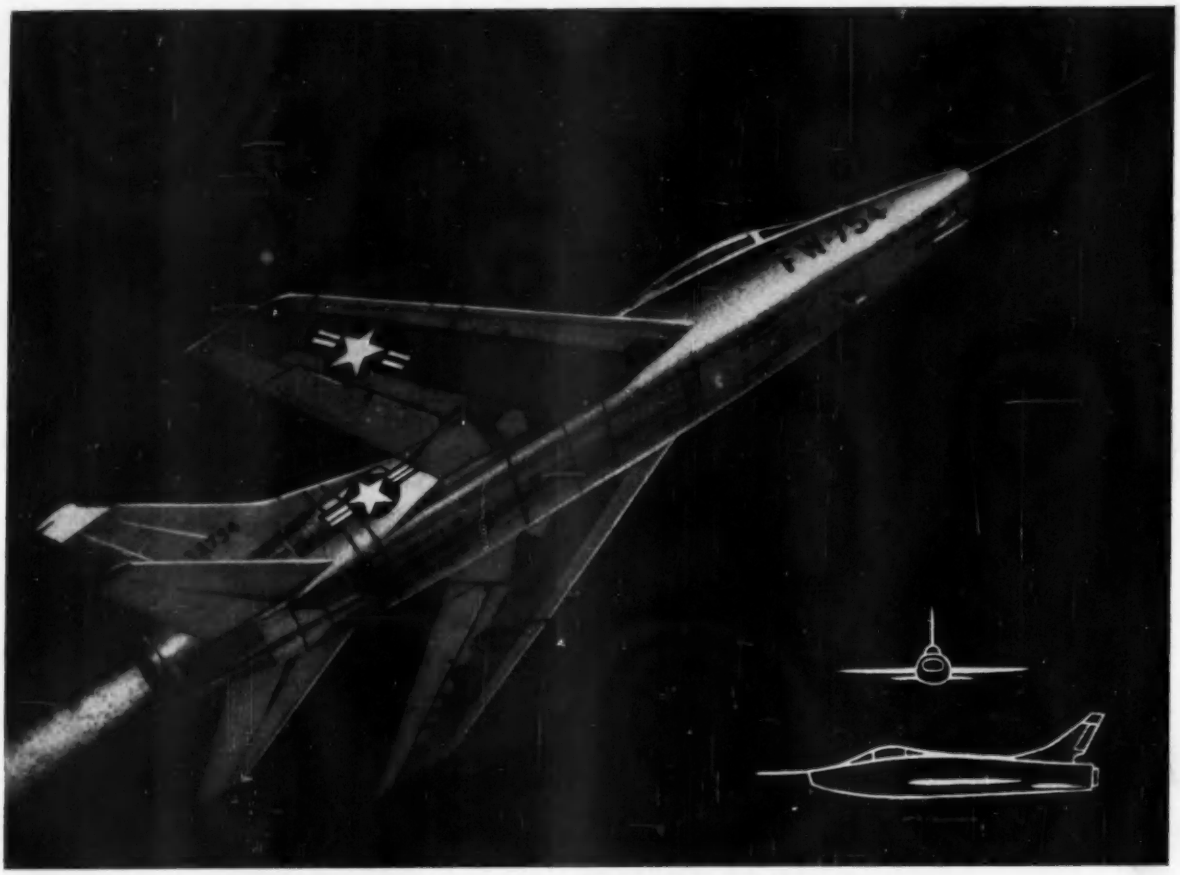


F-100 Super Sabre – built by North American Aviation, Los Angeles, California.

How they kept the F-100 from burning off her tail

A possible answer to a metal problem of your own

Skin temperatures go higher and higher toward the tail of the supersonic F-100 Super Sabre. It's a case of heat radiated from her powerful engine. So North American Aviation's designers changed from conventional alloy skin in cooler areas to titanium sheet in the intermediate areas . . . and to stainless steel where surface temperatures are highest.

So far, so good.

But how would you fasten these sections? The joints involve titanium-to-aluminum, to itself, and to stainless. Temperatures exceed 250°F and for a complex of reasons none of these materials makes suitable rivets for the job.

North American's designers found the answer in the firewalls of the F-100's engine. Sections exposed to heat radiation are joined with Monel* nickel-copper alloy rivets. These rivets are heat resistant . . . and keep their strength at 250°F (Good up to 600°F, in fact.) What's more, they're ductile: drive easily and don't crack under the gun. These properties make them just right for the skin fastening job, as North American proved during production of hundreds of F-100's.

When you want a tough, general-purpose alloy that's stronger than mild steel . . . that keeps its strength up to 600°F, shows good fatigue resistance, works easily, and has excellent resistance to many kinds of corrosive attack, include Monel alloy among the materials you consider.

And have a chat with Inco's Mechanical Engineering Section. Our files are packed with useful information on many metal problems. Yours may already be solved.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street — New York 5, N. Y.
*Registered trademark

INCO NICKEL ALLOYS

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE — PUBLISHED SEMI-MONTHLY

DECEMBER 15, 1957 — VOL. 117, NO. 12

FEATURES

NEWS PREVIEWS

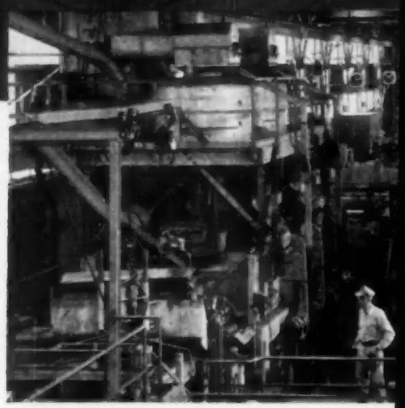
DEPARTMENTS

AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

EDITORIAL EXECUTIVE OFFICES, Chestnut and 56th Sts., Philadelphia 39, Pa., U. S. A. Cable address—Autoland, Philadelphia.

AUTOMOTIVE INDUSTRIES. Published semi-monthly by Chilton Company, Chestnut & 56th Sts., Phila. 39. Entered as Second Class Matter October 1, 1925, at the Post Office at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. In case of Non-Delivery Return Postage Guaranteed. Subscription price: To manufacturers in and suppliers to the automotive industries in the United States and Possessions, $2.00 per year; $3.00 for 2 years. All Others, $10.00 per year. Single copies, 50¢. Statistical Issue, $1.00.

One of the most efficient manufacturing operations in industry today is the production of automobile frames. For better, faster descaling, three of the four producers in this field have selected Pangborn Rotoblast Descaling Equipment.



ROTOBLAST replaces pickling at Midland Steel.

Clean it fast with **Pangborn** *ROTOBLAST®*

PANGBORN CORPORATION, Hagerstown 3900, Maryland
Manufacturers of Blast Cleaning and Dust Control Equipment

Vibration won't loosen FLEXLOC self-locking nuts

Where products must be reliable . . . must stand up under vibration, temperature extremes and hard use . . . designers specify rugged, reliable, precision-built FLEXLOC self-locking nuts.

HERE'S WHY:

FLEXLOC locknuts are strong: tensile strengths far exceed accepted standards. They are uniform: carefully manufactured to assure accurate, lasting locking action. And they are reusable: repeated removal and replacement, frequent adjustments, even rough screw threads will not affect their locking life.

Standard FLEXLOC self-locking locknuts are available in a wide range of standard sizes, types and materials to meet the most critical locknut requirements. Your local industrial distributor stocks them. Write us for complete catalog and technical data. Flexloc Locknut Division, STANDARD PRESSED STEEL CO., Jenkintown 53, Pa.

We also manufacture precision titanium fasteners. Write for free booklet.

FLEXLOC® LOCKNUT DIVISION

STANDARD PRESSED STEEL CO.

SPS

JENKINTOWN PENNSYLVANIA

For whatever you make . . .

N-A-X® HIGH-STRENGTH STEELS CONTRIBUTE STRENGTH WITH LIGHT WEIGHT

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☐ Please send me 12-page illustrated technical catalog on N-A-X HIGH-STRENGTH steels.
☐ Please have your representative contact me.

Name_____ Title_____

Company_____

Street_____

City_____ Zone_____ State_____

Hamlintainers—the versatile knock-down, pallet-type steel shop and shipping boxes built by Hamlin Metal Products Corp., Akron, Ohio—make still another profitable example of the adaptability of N-A-X HIGH-STRENGTH steels.

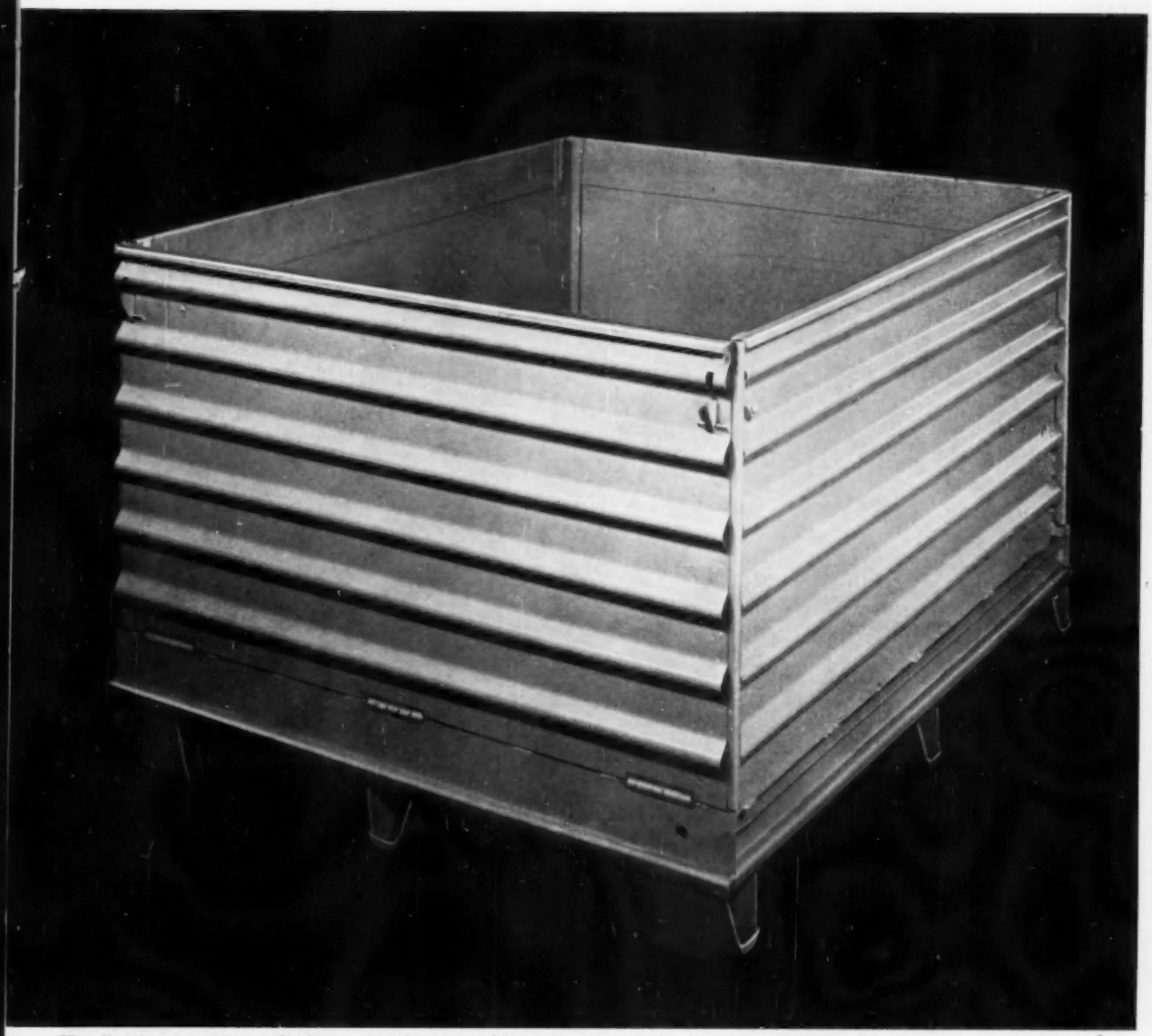
Developed in answer to Hamlin's own shop problems, *Hamlintainers* quickly proved themselves in the nation's leading automobile, aircraft and appliance manufacturing plants. On the job *Hamlintainers* must have strength to carry heavy fabricated parts and still be light enough for fast, easy plant handling and minimum return freight costs.

Like so many producers, Hamlin looked for and found these characteristics of strength with lightness in N-A-X HIGH-STRENGTH steels, along with other significant benefits.

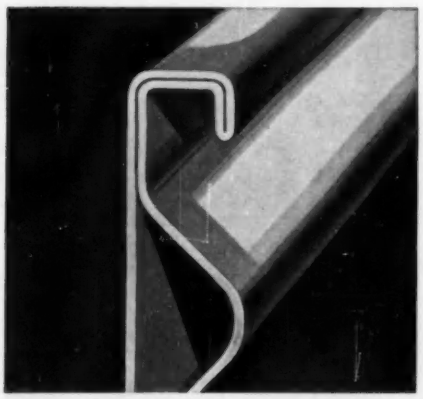
Check These Important Advantages for Your Job: N-A-X HIGH-STRENGTH steels—both N-A-X HIGH-TENSILE and N-A-X FINEGRAIN—compared with carbon steel, are 50% stronger . . . have high fatigue life with great toughness . . . are cold formed readily into difficult stampings . . . are stable against aging . . . have greater resistance to abrasion . . . are readily welded by any process . . . offer greater paint adhesion . . . polish to a high luster at minimum cost.

Although N-A-X FINEGRAIN's resistance to normal atmospheric corrosion is twice that of carbon steel, N-A-X HIGH-TENSILE is recommended where resistance to extreme atmospheric corrosion is important.

For whatever you make, from steel boxes to boxcars, with N-A-X HIGH-STRENGTH steels you can design longer life, and/or less weight and economy into your products. Let us show you how.



Hamlintainers *are the result of more than five years of intensive research, development and practical on-the-job testing. Thanks to* N-A-X HIGH-STRENGTH *steels,* Hamlintainers *are tight enough to hold rivets, strong enough to carry forgings and* light *enough for moving by any standard plant fork-lift truck.*



The great formability of N-A-X HIGH-STRENGTH *steels makes this design easy to produce. Rounded edges add strength, safety.*

In less than 20 seconds, one worker can set up a Hamlintainer, *or fold it flat for easy stacking when not in use. This important benefit continues to win new friends for* Hamlintainers *with manufacturers.*

What's the cost of a Diesel?

First cost of a Diesel is quite understandably more than a gasoline engine because Diesel's fuel-saving high-compression ratio requires greater precision and ruggedness. But the Diesel more than pays for itself in timesavings, fuel economy and reduced maintenance. Due to simpler 2-cycle design and lower-cost interchangeable parts, a *GM Diesel gives you lowest cost over the entire life of the engine.*

Single Engines . . . 30 to 300 H.P. Multiple Units . . . Up to 893 H.P.

This new "Jimmy" Diesel is the pullingest engine ever hitched to a load

New GM "71E" Diesel is available for any make truck 26,000 GVW and up—produces higher torque at lower speed

A General Motors 2-cycle Diesel not only moves loads up grades faster, *but even outperforms engines more than half again its size.*

That's because *every* cylinder delivers power *every* revolution of the crankshaft—*twice* as many power strokes per crankshaft revolution as 4-cycle Diesels. This makes a "Jimmy" Diesel more powerful for its size, smoother running, faster accelerating.

In addition, the new "6-71E"* engine develops a full 577 foot-pounds of torque at 1200 rpm—*gives you higher torque at lower speed for greater pulling ability.*

More Work—Less Down-Time

Equally important, the "Jimmy" Diesel has the simplest, most efficient fuel injection of any Diesel. Patented unit injectors feed fuel into cylinders under high pressure in exactly metered, precisely timed charges. They eliminate complex fuel pumps and high pressure lines—making GM Diesels far easier and cheaper to maintain. This—plus the new "E" engine's highly improved "breathing" with *four* exhaust valves per cylinder and bigger air inlet ports—assures more complete combustion, faster response to throttle, improved fuel economy and cleaner exhaust.

Leading highway haulers who have used this new "71E" engine report outstanding fuel mileage and reduced upkeep compared with other Diesels they operate and major savings over gasoline engines they have replaced.

See your GM Diesel distributor about repowering your present equipment. When you're in the market for new trucks, ask for this great new GM "71E" Diesel. And if the truck you choose isn't immediately available with a "Jimmy," turn your truck over to the GM Diesel distributor for a "71" installation. *Write for free copy of six-page illustrated brochure on these new GM Diesel Truck Models.*

*6-71E—210 h.p.; 4-71E—140 h.p. New Turbopower models deliver higher horsepower: 6-71T—236 h.p.; 4-71T—171 h.p.

DETROIT DIESEL

Engine Division of General Motors, Detroit 28, Michigan

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario

Regional Offices:

New York, Atlanta, Detroit, Chicago, Dallas, San Francisco

Now—more than ever—*it pays to standardize on GM Diesels*

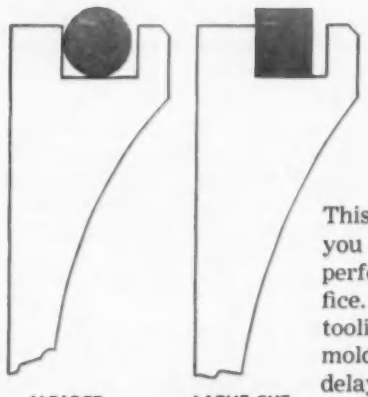
GM
GENERAL MOTORS
DETROIT DIESEL POWER

—available in 1485 applications of power equipment built by more than 175 manufacturers

Parts and Service *Worldwide*

Why ACADIA LATHE-CUT SYNTHETIC RUBBER SEALS

can save you money in *STATIC* or *MOVING* seal applications



MOLDED O-RING SEAL

LATHE-CUT SEAL

This seal will save you money with no performance sacrifice. Minimum tooling cost, no molds, no costly delays. Can be made up to 25" I.D.

Acadia Synthetic Rubber Parts are of the highest quality components, processed for oil resistance, good aging properties, resistance to heat. They can be furnished in any dimension or special compound you desire to precision tolerances. They are another example of Acadia's ability to SAVE YOU MORE..SERVE YOU BETTER.

There's an Acadia Sales engineer near you to serve you. Write us today, and we'll put him in touch with you immediately.

ACADIA *Synthetic* **PRODUCTS**

DIVISION OF WESTERN FELT WORKS
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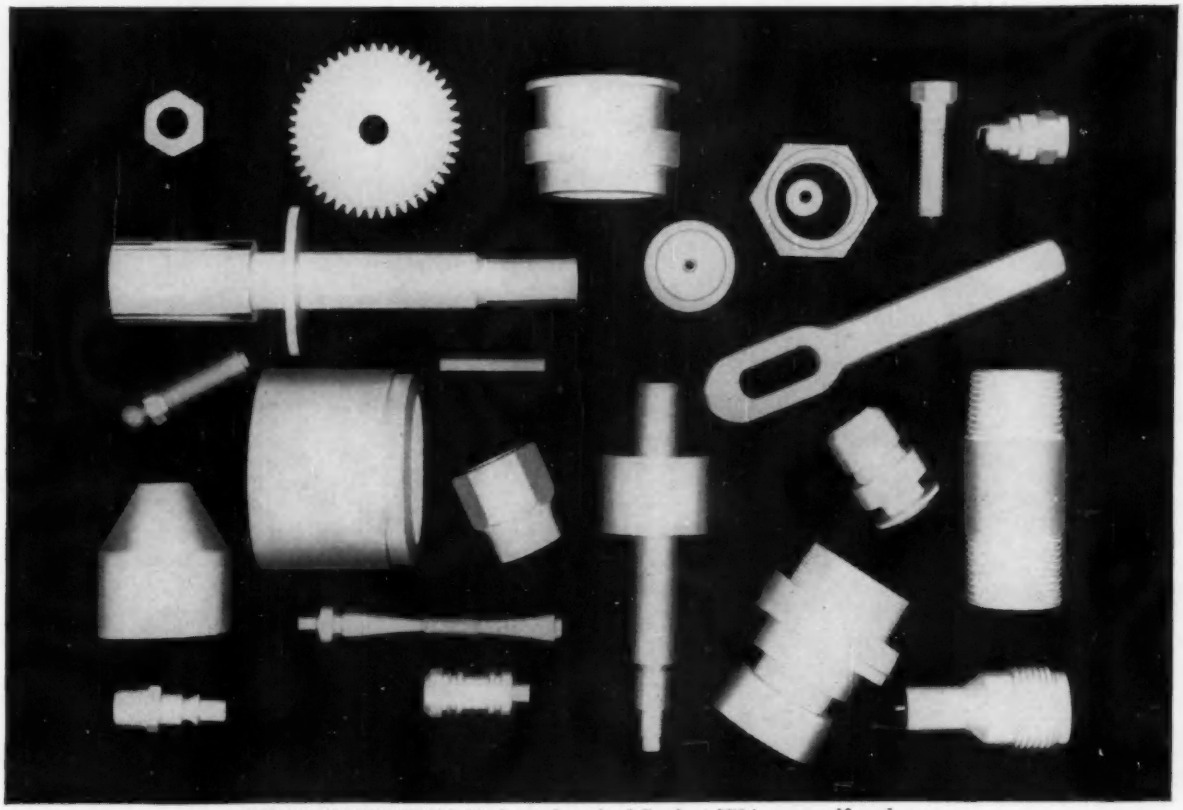

ONE OIL, MANY METALS. Moderately priced Sunicut 5534 gave uniformly excellent results in the machining of this wide variety of top-quality steel parts.

Designed especially for job shops...

NEW SUNICUT 5534 CAN BE USED ON A WIDE VARIETY OF STEELS

SUNICUT® 5534 ends your search for a single cutting oil that can assure quality machining of a wide variety of ferrous metals...ranging from B1112 to 4130 and including free-machining stainless steels.

A non-emulsifying, transparent cutting oil, Sunicut 5534 can speed production of general screw machine and turret lathe work. It gives excellent finish in tapping, drilling, threading, and light stamping operations and can be used on many special jobs run at both high and low speeds.

Try moderately-priced Sunicut 5534. It can save you money by reducing your cutting oil inventories and oil change time. It can boost your production and profits.

For detailed information, prices and delivery data about this new, versatile cutting oil, call your Sun representative today. Or write directly to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AA-12.

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SUN OIL COMPANY Philadelphia 3, Pa.

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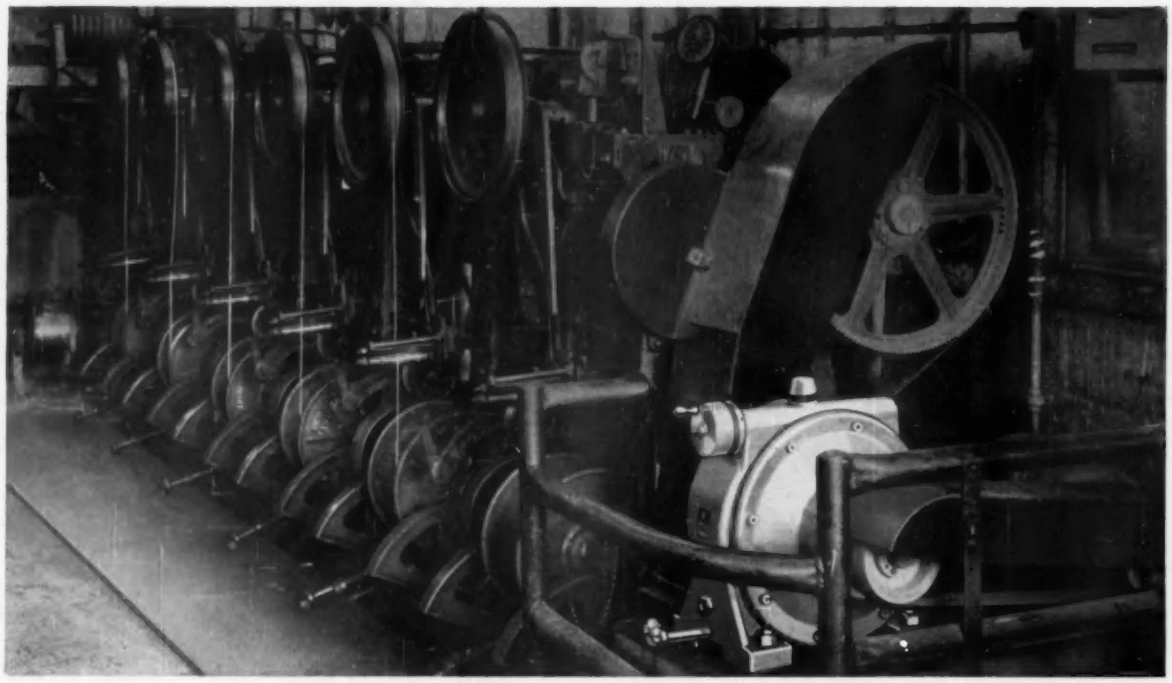


CLEVELAND SPEED VARIATOR

winds 4 reels of cable simultaneously—where old drive slipped with 2 reels

THIS machine winds tin-plated wire used in the manufacture of cable. The Cleveland SpeedVariator on it replaced a drive of the same capacity with which there was slippage and frequent maintenance.

With the new Cleveland, it was immediately possible to run simultaneously 5 reels of the heaviest wires, as compared to only 2 with the old drive. In fact, the 10 HP drive motor soon proved unequal to the 5-reel load which the Cleveland was handling without slippage. Now driving 4 reels of the heavy wire, the machine is doing double the work it formerly handled.

Wherever you need a variable speed drive, consider Cleveland. Write for Bulletin K-200. The Cleveland Worm & Gear Company, Speed Variator Division, 3274 East 80th Street, Cleveland 4, Ohio.

Note these major advantages of the Cleveland Speed Variator

1 An extremely compact unit, with input and output shafts in line and rotating in the same direction.

2 Operable at any input speed up to 1800 rpm—either clockwise or counterclockwise rotation.

3 Rated for constant horsepower output over a 9:1 or 6:1 range; or for constant torque over a 6:1 range.

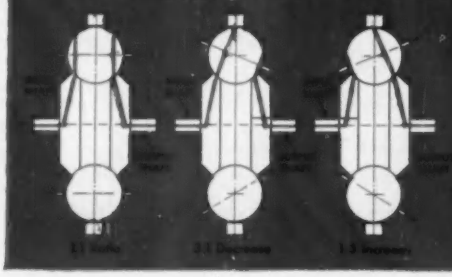
4 Infinitely variable output speeds over the entire range of adjustment.

5 No slippage—positive, automatic torque adjustment in direct proportion to the loads encountered.

6 Ample bearing support on both shafts for overhung pulleys.

7 Long life and minimum maintenance through absence of belts and complicated linkages.

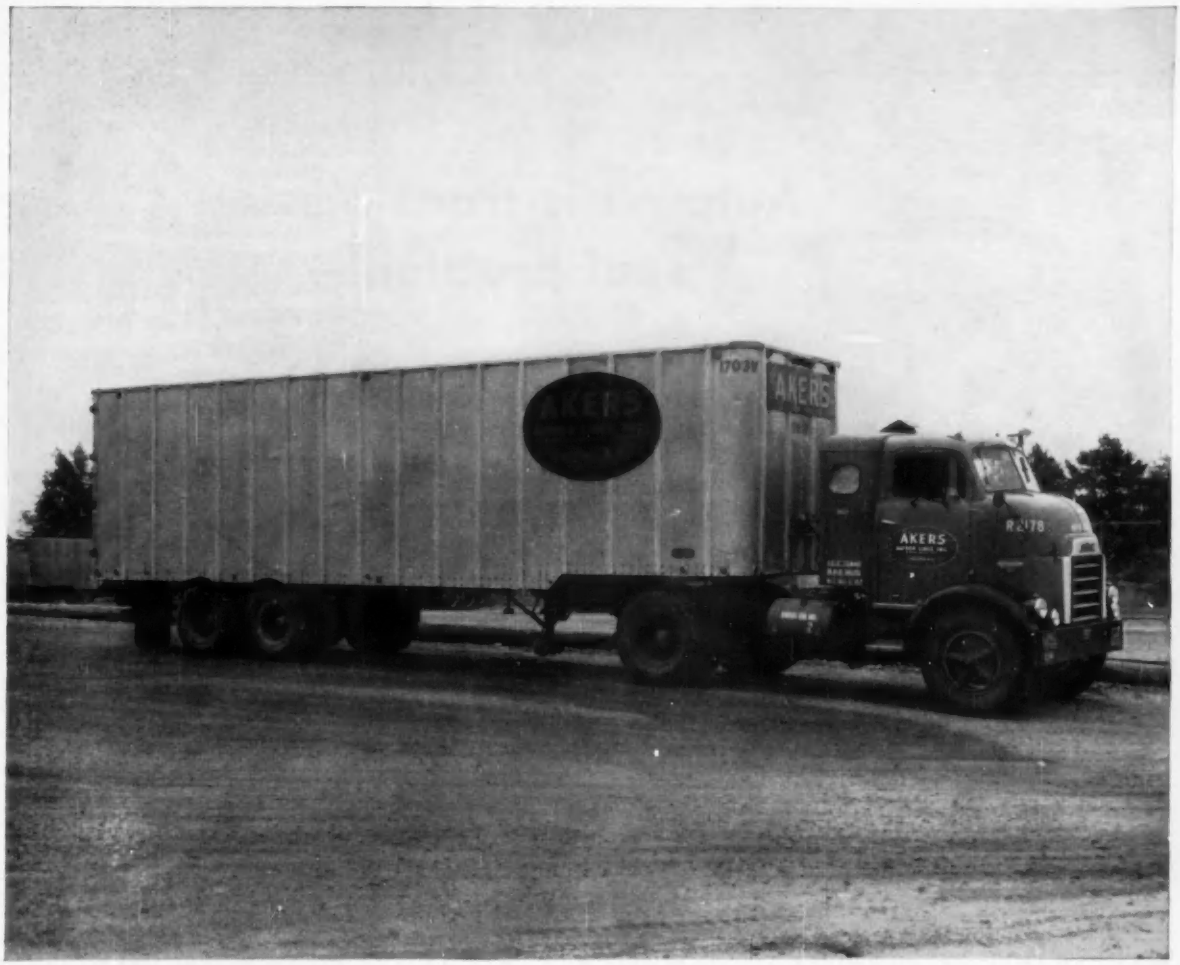
HOW THE CLEVELAND SPEED VARIATOR WORKS



Power is transmitted from input shaft to output shaft through alloy steel driving balls which are in pressure contact with discs attached to the two shafts.

Relative speeds of the shafts are adjusted by changing the positioning of tracks on which the balls rotate (diagram, right, shows runaway Variator with hand regulating wheel).

"It's the Drive That's on the Ball."



One of Akers' 40 new GMC DF-862 diesel powered units equipped with Fuller 10-speed R-96 ROADRANGER Transmission.

40 more FULLER ROADRANGER® Transmissions added to Akers' fleet

To Akers' original fleet of 10 GMC 860 tractors, 40 new GMC DF-862's are now being added...and *all 50* are equipped with Fuller 10-speed R-96 semi-automatic ROADRANGER Transmissions. Says William H. Tomlin, Assistant to the General Manager and Superintendent of Equipment, Akers Motor Lines, Inc., Gastonia, North Carolina: "We are very pleased with the service that the Fuller ROADRANGER Transmissions are giving us. They are a favorite with our drivers."

Fuller ROADRANGER Transmissions give Akers Motor Lines:

- **Easier, quicker shifts—28% steps between ratios**
- **One shift lever controls all 10 forward and 2 reverse speeds**
- **No gear splitting—10 selective gear ratios are evenly and progressively spaced**
- **Engines operate in peak hp range with greater fuel economy**
- **Less driver fatigue—⅓ less shifting**
- **Range shifts pre-selected—automatic and synchronized**
- **Compact space-and-weight-saving economies—the most compact 10-speed transmission available**
- **Transmission weight under the cab—permitting more cargo to be carried on the payload axles**

Get full facts on Fuller ROADRANGER Transmissions from your truck manufacturer or truck dealer now!

FULLER

TRANSMISSIONS

FULLER MANUFACTURING CO. Transmission Division • Kalamazoo, Mich. Unit Drop Forge Div., Milwaukee 1, Wis. • Shaler Axle Co., Louisville, Ky. (Subsidiary) • Sales & Service, All Products, West. Dist. Branch, Oakland 6, Cal. and Southwest. Dist. Office, Tulsa 3, Okla.

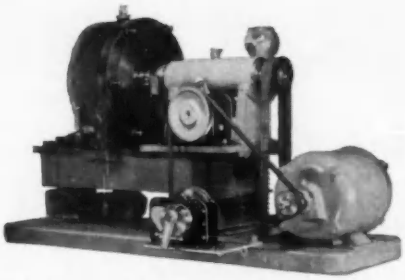
Automatic transmission seal problem—

New National Syntech® proves dependable answer in front pump seal position

Constant temperatures of 250°F, peaks of 300°, continual change in shaft speed, and total inaccessibility of the seal without costly teardown—these are a few of the sealing problems in the front pump of today's automatic transmissions for passenger cars.

To help meet this challenge, National engineers have produced a new oil seal. The new design, a steel encased, spring-loaded unit with Syntech synthetic sealing lip, is characterized by an unusually long flex section in the lip, a special, light-loading tension spring, and the time-tested, low torque Syntech lip itself.

Factory engineers report that the new National seals are proving extremely reliable in the application. Dealers also find the front pump seals are very reliable and do not require early replacement.

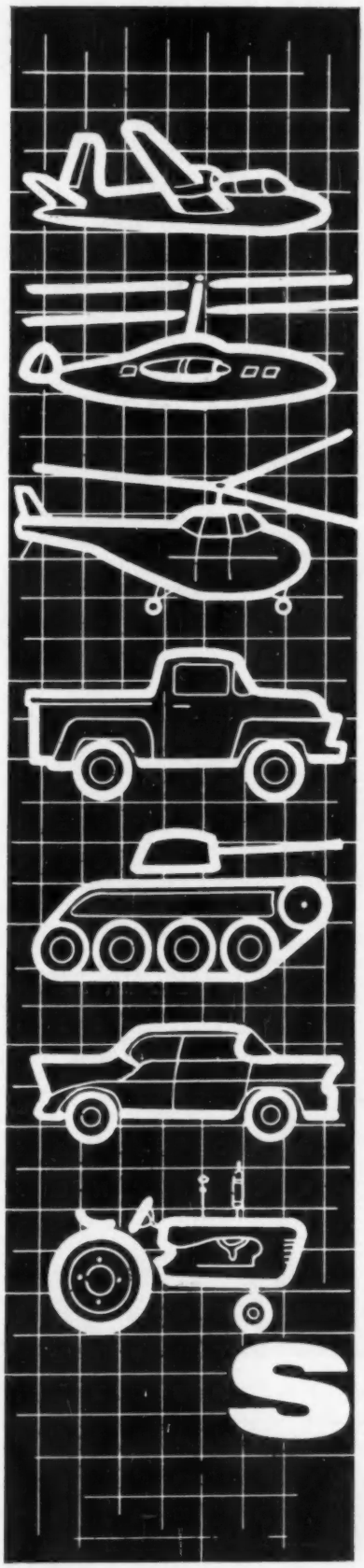


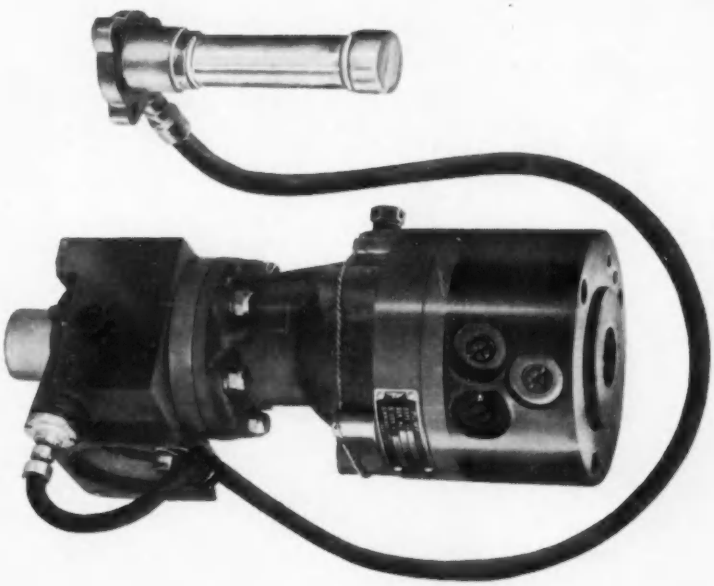
To design and thoroughly test the new seal, National engineers developed a new transmission simulator which exactly duplicates front pump operating conditions at all car speeds.

Get real help on seal engineering problems. Call the National Engineer.

NATIONAL SEAL Division, Federal-Mogul-Bower Bearings, Inc.

General Offices: Redwood City, California; Plants: Van Wert, Ohio, Downey and Redwood City, California





SIMMONDS

Fuel Injection Systems in Full Production for Gasoline Engines

After several years of rigorous tests under extreme conditions of weather and environment, the Simmonds SU Fuel Injection System has been put into full production for U. S. Ordnance engines.

The System is being adapted to engines in all horsepower ranges for use in passenger cars, trucks, buses, marine and farm equipment, earth and snow moving equipment.

The Simmonds SU Fuel Injection System is a multiple point, low-pressure, timed speed-density injection system offering these definite advantages: it overcomes major icing problems; it improves cold starts; it eliminates the need of hot-spots and preheaters with a resulting increase in power output; it compensates for variations in barometric pressure, altitude and intake air temperature. The System also provides improved fuel distribution resulting in better cylinder head cooling — its operation is unaffected by engine attitude.

Detailed information on SU Fuel Injection Systems is now available. Write on your company letterhead for literature.

Simmonds AEROCESSORIES, INC.

General Offices: Tarrytown, N. Y. • Branch Offices: Dayton, Ohio • Detroit, Mich. • St. Louis, Mo. • Dallas, Texas • Wichita, Kans. • Glendale, Cal. • Seattle, Wash. • Sole Canadian Licensee: Simmonds Aerocessories of Canada Limited — Montreal

WHERE EQUIPMENT FAILURE

Spells Disaster!

Rocketing down a mountain ski run is no place to snap a strap! In fact, any failure of equipment in this action-packed sport can spell disaster — just as does any failure in automotive suspension.

Like the experienced skier, the prudent designer and engineer rely on time-tested and proven equipment to avoid disastrous failures. That's why the dependability of Burton springs is so important . . . why they are so widely used.

BURTON

AUTO SPRING CORP.

. . . Vital Support for the Automotive Industry . . .

WESTERN AVENUE AT FORTY-EIGHTH STREET

CHICAGO 32, ILLINOIS

Let Burton engineers, backed by modern equipment and scientifically controlled methods, solve your spring suspension problems.

MORE THAN

10,000,000

HYATT TAPERED ROLLER BEARINGS

WERE BUILT INTO 1957 MODEL AUTOMOBILES!

Nearly half of all American cars and trucks built today have HYATT Tapered Roller Bearings

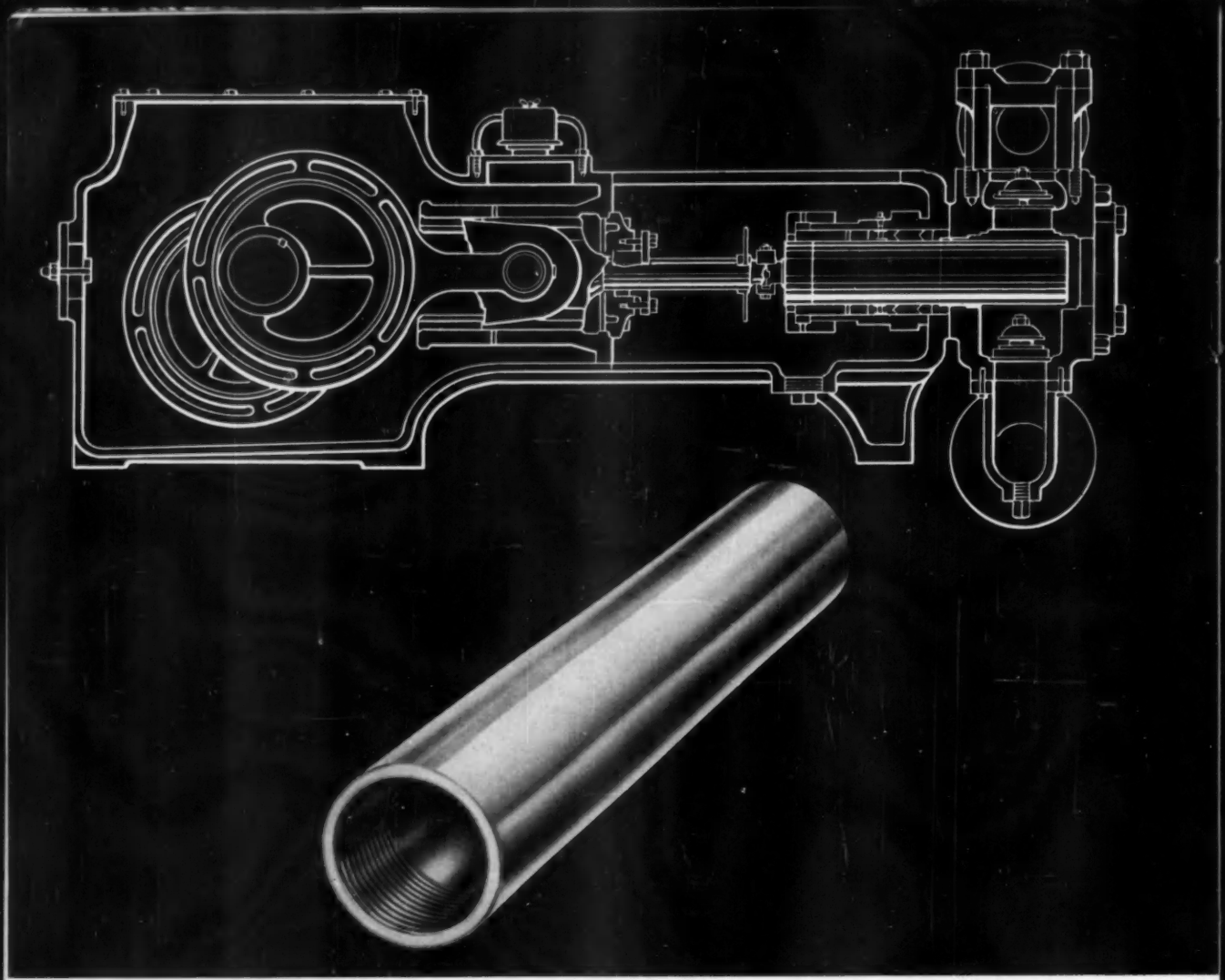
That's right—over *ten million tapered* roller bearings were supplied by HYATT during the 1957 model year. Pretty convincing proof that America's recognized leader in the cylindrical bearing field is also a big and growing source for *tapered* roller bearings!

No facilities in the industry surpass HYATT'S multi-million dollar, fully integrated production lines which are turning out tapered roller bearings with greater uniformity than ever before achieved in quantity production. You'll find *things run smoother* when they roll on HYATT bearings! Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.; Detroit; Pittsburgh; Chicago; and Oakland, California.

1908–1958 GM FORWARD FROM FIFTY

HYATT HY-ROLL BEARINGS

FOR CARS AND TRUCKS



Reducing Costs With Job Matched Tubing

Does a higher grade tube really cost more? Reduced overall manufacturing cost of pump plungers resulted when one maker switched from tubing made from open hearth processed alloy steel to B&W electric-furnace Alloy Steel Tubing. Rejections on a large production run were reduced drastically (10.75% to 1.25%).

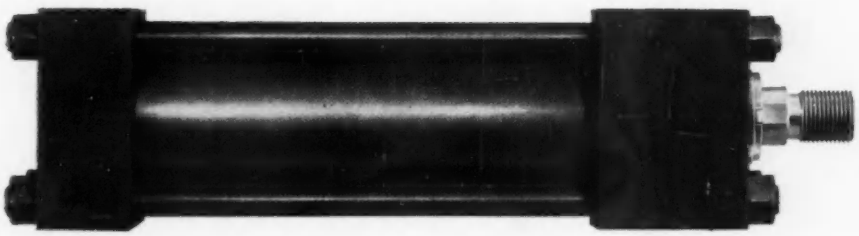
The plunger had to have a very good finish and was to be chrome plated. Jobs like this require high quality and "clean" steel. Because of B&W's melting practices and familiarity with making "clean" steels for bearings and other applications, it was suggested to the fabricator that he consider B&W electric-furnace 8620 Steel Tubing. The use of B&W electric-furnace Alloy Steel drastically reduced rejects on the finished part.

Once again Mr. Tubes proved conclusively that final cost—not initial cost—is the measure of good tube fabricating practice. If you're concerned with costs as well as producing a good finished product, get in touch with Mr. Tubes. He can help you save money. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.

TA-6100-M5

Seamless and welded tubular products, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels.

Made for the tough buyer



The discriminating engineer is intolerant—intolerant of anything but the very best in his plant and in his product.

For these tough buyers Hannifin cylinders are made. Into these cylinders go original, exclusive features of design, precision manufacture, and the ability to outperform others with the very minimum of maintenance.

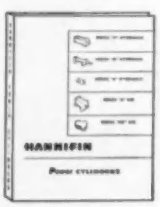
You would expect to pay more for Hannifin cylinders. Actually there is no price premium. We can deliver them to you promptly in the sizes and mounting styles you require.

AIR AND HYDRAULIC

HANNIFIN

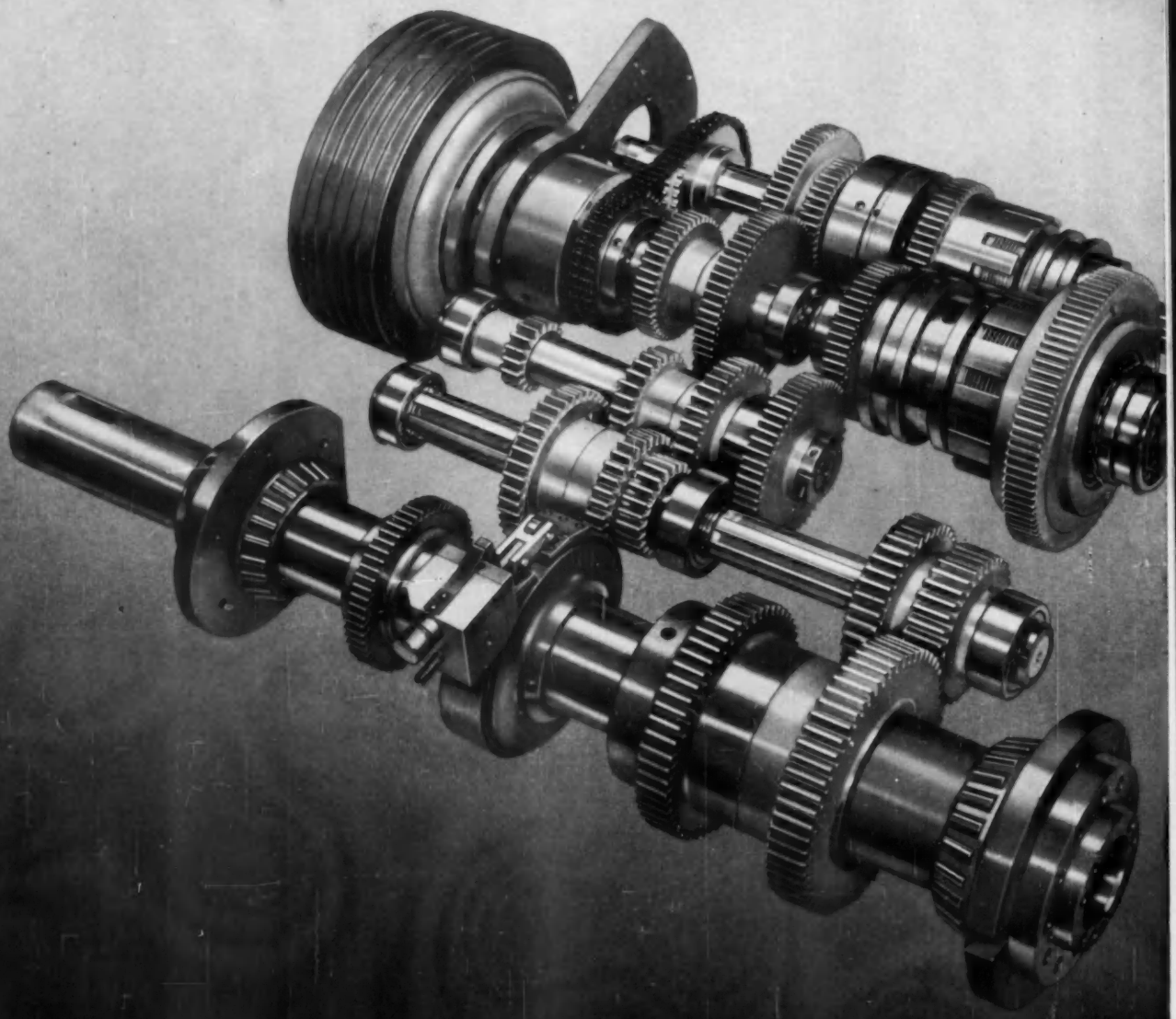
POWER CYLINDERS

Write for your copy of this new Hannifin Cylinder File —complete, easy-to-use, easy-to-order-from information on five lines of Hannifin cylinders. Hannifin Company, 543 South Wolf Road, Des Plaines, Illinois.



The **power reserve** *and* **range of speeds**

YOU'LL NEED FOR THE



TOOLS OF TOMORROW

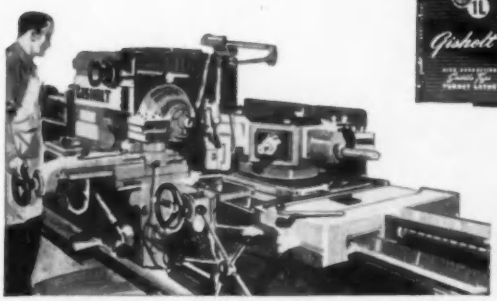
New GISHOLT MASTERLINE SADDLE TYPE TURRET LATHE

WANT MAXIMUM OUTPUT AND ACCURACY from today's carbide tools—with an ample reserve of power and speeds to meet tomorrow's tooling requirements?

That's what you'll get—*now*—from this powerful, rugged Gisholt MASTERLINE Saddle Type Turret Lathe. Prime example of this machine's advanced features is the rugged Headstock Gear Train, shown at the left. Here, you can get 24 different forward speeds—all from a *single*-speed motor. This means you get *full* power *all* the time—a critically important feature for those heavy cuts at punishing feeds.

But that's not all. To give you maximum performance from this powerful gear train, Gisholt designers have backed it with faster speed changes through the Hydraulic Speed Selector (effortless speed shifts without waiting or computing); a hydraulically operated Hi-Lo speed change in a 6:1 ratio (without stopping the spindle or shifting gears); and a new Self-Adjusting Electric Clutch and Brake (smooth, fast starting and stopping, plus more accurate inching of the spindle).

Ask your Gisholt Representative to give you the complete facts. Why not call him today?



ASK FOR complete set of Gisholt MASTERLINE Saddle Type Turret Lathe Bulletins.

GISHOLT MACHINE COMPANY

MASTERLINE GISHOLT SINCE 1887

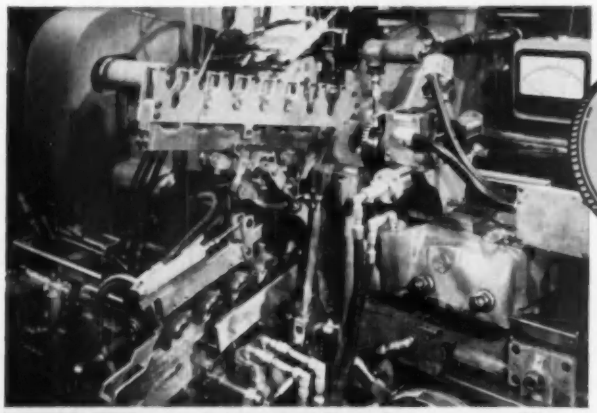
Madison 10, Wisconsin, U.S.A.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • PACKAGING MACHINES • MOLDED FIBERGLAS PLASTICS

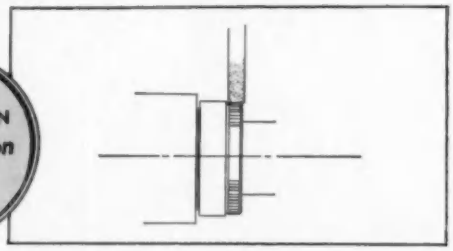
The more you grind the more you save with Norton...

cost-cutting automatic operations

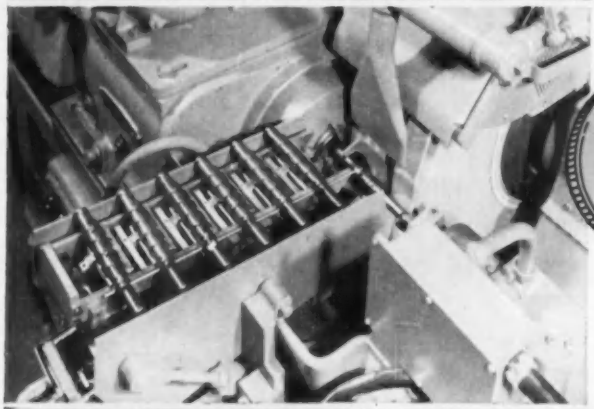
Typical automatic features on Norton grinders



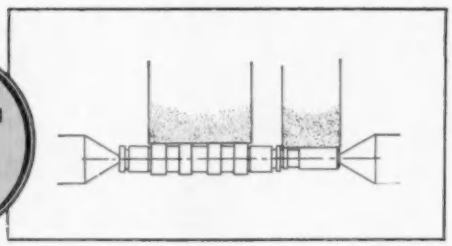
SAVINGS ON *Transmission Gears*



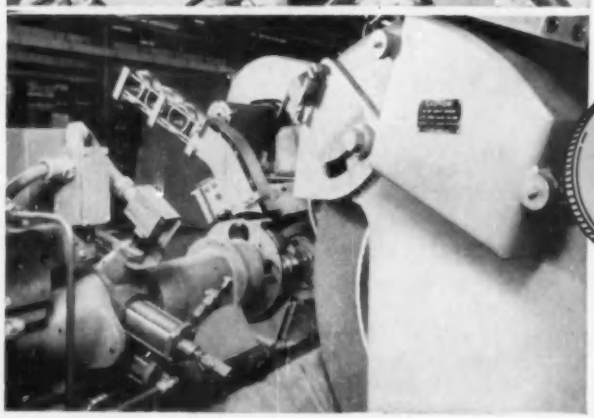
In a Type CTU Cylindrical Grinder arranged for completely automatic loading, grinding, and unloading of transmission gears, the part is held on a chuck and grinding cycle is terminated by an automatic air-electric grinding gage that signals when work is to size.



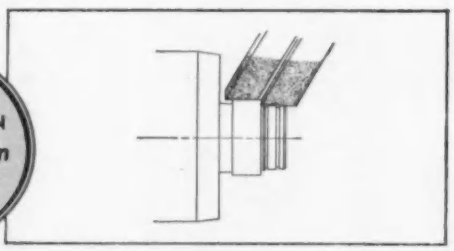
SAVINGS ON *Valve Pistons*



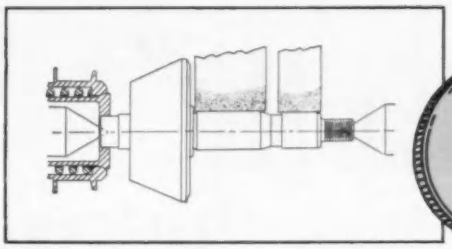
When a Type CTU Grinder is arranged for fully automatic loading and grinding of valve pistons the part is held on centers and driven by a floating type collet. Work is ground by a double-wheel mount.



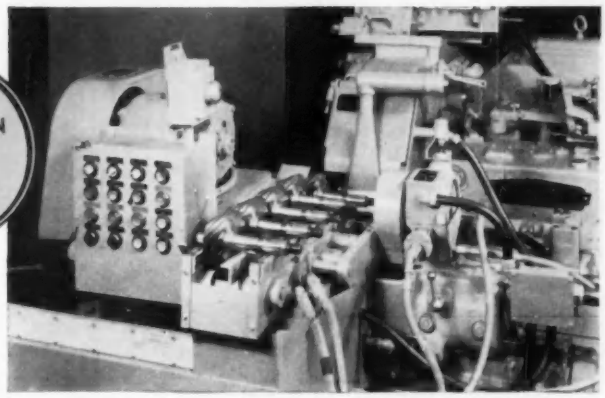
SAVINGS ON *Transmission Sleeves*



On this Type CV-4 Angular **Wheelslide** Grinder chucked grinding of transmission sleeves is arranged in a completely automatic cycle. Longitudinal movement of a revolving turret loads the machine. A stripper type plate removes the piece when turret retracts as the grind is terminated by electrically timed control.



SAVINGS ON *Stem Pinions*



The Stem Pinion Grinder reduces time and effort with a completely automatic cycle, electrically timed arrangement for grinding these hard-to-handle parts. Progressive escapements in the automatic loading mechanism release the parts in succession, avoiding gear mesh.

NEW ECONOMY!

Norton No. 2 Unitized Transfer Grinder Grinds Crankpins Automatically

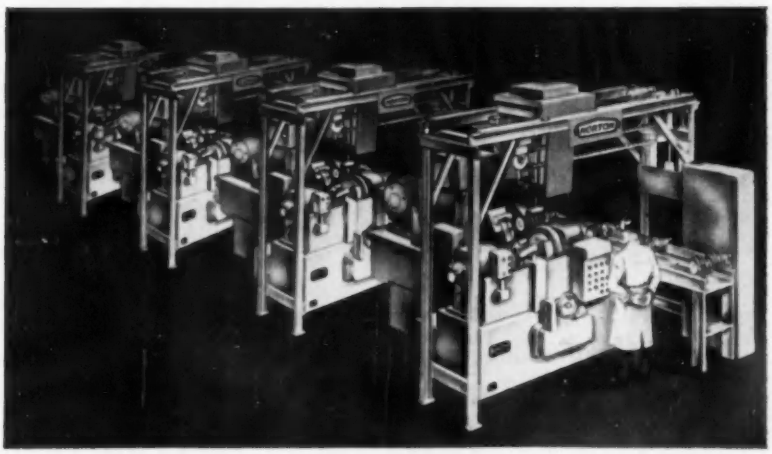
Here's a newly developed machine that automatically grinds crankpins faster and for less money than ever before possible. Advanced features like the following are reasons why:

Unitized Operation. Each grinding station, operating independently, can be automatically by-passed without affecting continuous production.

New Transfer Mechanism. Double set of hooks speeds loading, unloading and transferring of crankshafts from one grinding unit to another.

Fast Production. Cycling grinds 240 crankpins on 60 V-8 crankshafts per hour, due to many automatic operations.

Only One Operator Needed. Others are freed for different jobs. And the machine reduces floor-space requirements.



Norton has developed a wide range of fast, automatic grinders. You can get them in conventional and angular wheelslide types — also in special types for grinding automotive valve faces and crankshaft pins.

Remember: only Norton offers you such long experience in both grinding machines and wheels to bring you the "Touch of Gold" that helps you produce more at lower cost.

For further information about these machines — including how the No. 2 Unitized Transfer Crankpin Grinder can save you many dollars daily — contact your Norton Representative. Or write to NORTON COMPANY, Machine Division, Worcester 6, Mass.

District Offices:
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To Economize, Modernize with **NEW**

NORTON

GRINDERS and LAPPERS

Making better products... to make your products better

NORTON PRODUCTS:
Abrasives • Grinding Wheels • Grinding Machines • Refractories

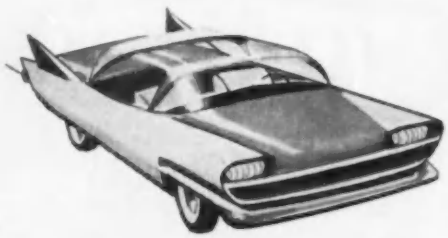
BEHR-MANNING DIVISION:
Coated Abrasives • Sharpening Stones • Behr-cat Tapes

"PROVING GROUND"
for tomorrow's timing chains

PRECISE INSTRUMENTS accurately record performance of timing chain drives on six current-model engines in adjoining dynamometer laboratory.

TYPICAL TEST STAND . . . conforms to accepted automotive industry testing standards.

Through advanced testing techniques, LINK-BELT perfects new timing chain designs... by automotive industry standards



LINK-BELT's modern dynamometer rooms—in which the latest in instrumentation is used in timing chain experiments with today's engines—serve as proving ground for automotive timing chain designs and materials. This research has produced such developments as the space-saving 11/16-in. width timing chain used by major auto makers since 1949. And today's tests are helping to perfect new timing drive efficiencies for the cars of tomorrow.

You are welcome to enlist the facilities of the world's largest chain plant—plus Link-Belt's 45 years of timing chain application experience—in furnishing a test drive to your specifications. Or, for complete engineering and specification data, write for Book 2065.

14,720

LINK-BELT

TIMING CHAINS AND SPROCKETS

LINK-BELT COMPANY: 220 S. Belmont Ave., Indianapolis 6, Ind. Offices in Principal Cities.

Don't Forget... Stainless Steel Doesn't Rust*

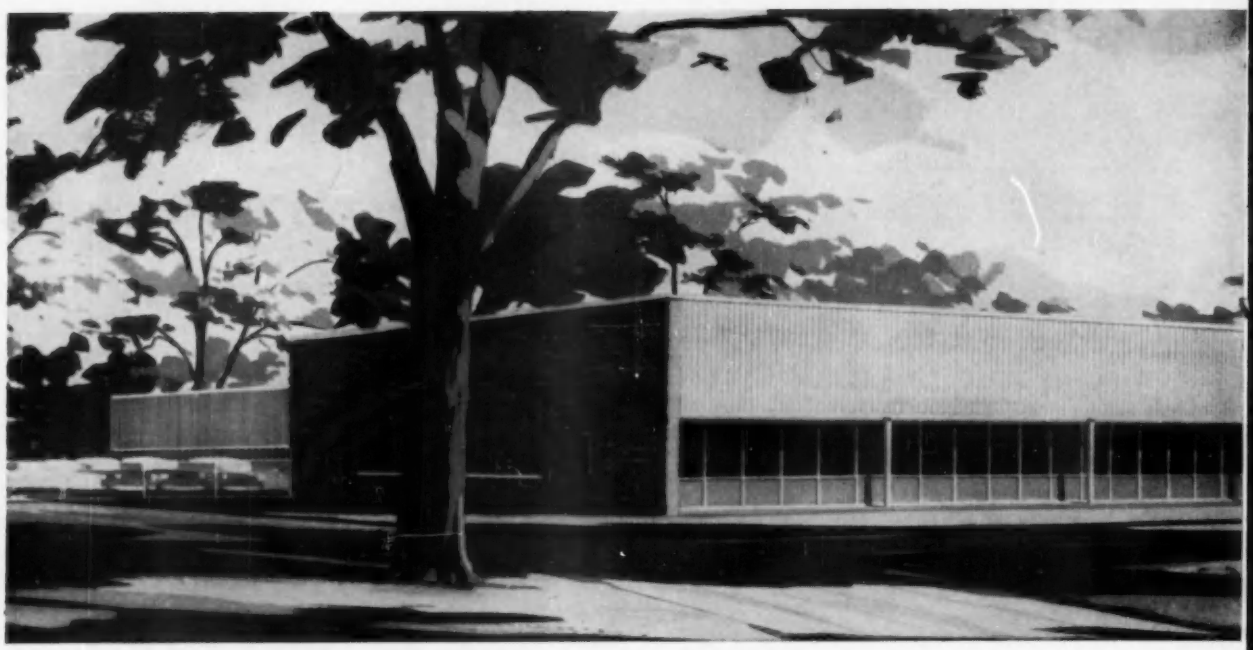
*Elementary? Yes—but it's an elementary reason why car buyers prefer autos with stainless steel trim and parts! Stainless steel's beauty is more than skin deep... its utility lasts the life of the car, adds *resale* value. Stainless doesn't dent like other metals, resists scratches, road chemicals, comes bright and clean with soap and water. And the *best* stainless steels are made with Vancoram Ferro Alloys. Your supplier can give you more details about the added value you can build into your autos—with *stainless steel!*

VANCORAM

VANADIUM CORPORATION OF AMERICA

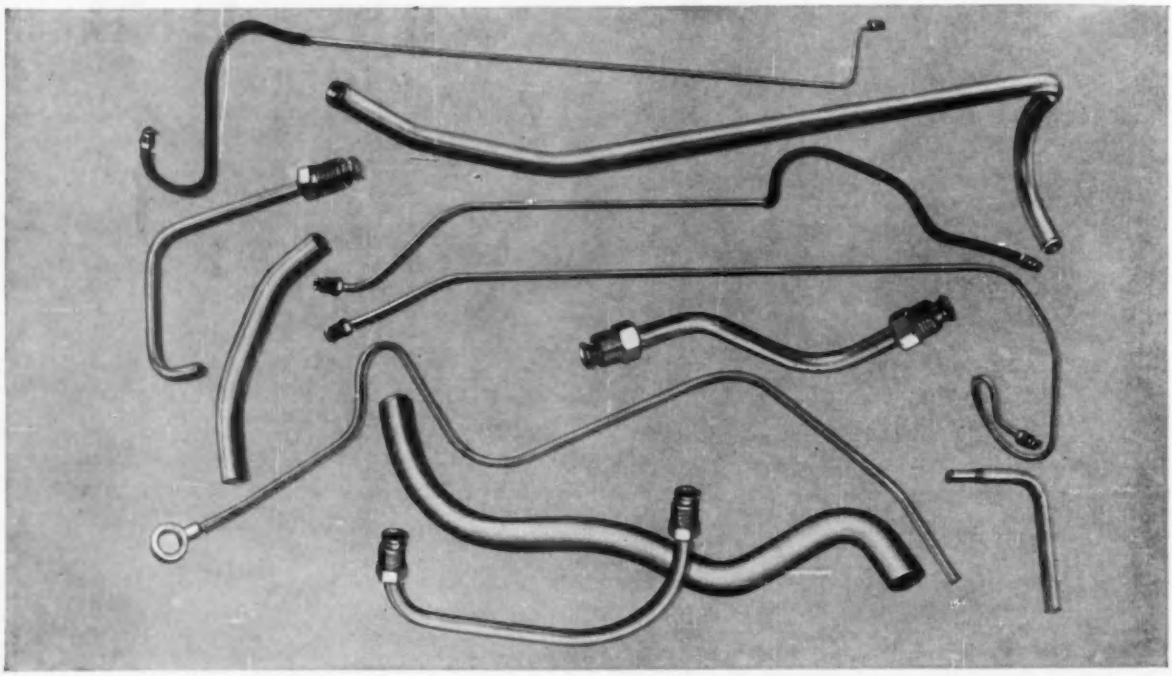
420 Lexington Avenue, New York 17, N.Y. • Chicago • Cleveland • Detroit • Pittsburgh

Producers of alloys, metals and chemicals

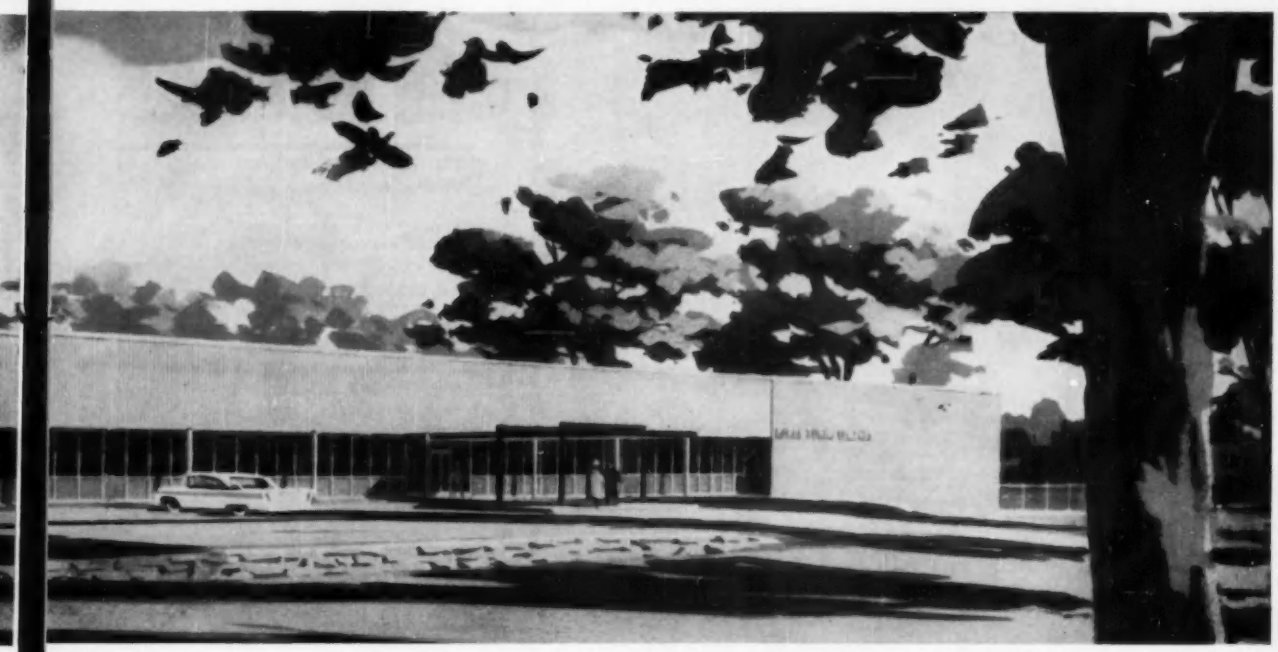


To satisfy your demand for fabricated parts:

Bundy Tubing



These typical automotive tubing parts now are in mass production at Bundy's new Winchester Division. Strong, leakproof Bundyweld Tubing, fabricated into a variety of complex shapes, *is used on 95% of today's cars, in an average of 20 applications each.*



Winchester Division, Bundy Tubing Company's newest plant, has 103,500 square feet of floor space devoted exclusively to fabricating parts from famous Bundyweld® Tubing.

expands again

New Winchester Division devotes 103,500 sq. ft. of floor space to high-speed, precision manufacture of parts from Bundyweld!

Bundy's new air-conditioned fabrication plant in Winchester, Ky., is open. And its every square inch has been planned, tooled and staffed to give you famous Bundy® precision and high quality in fabricated tubing parts . . . at low, mass-production costs.

Winchester Division now offers you all these:

Modern equipment—New machines fabricate tubing parts quickly, precisely, economically.

Experienced personnel—Highly trained production operators . . . long-time Bundy men in key supervisory slots.

Tight quality-control—Rigid inspection holds your specifications exactly . . . maintains your quality standards.

On-time deliveries—Modern equipment insures efficient handling, prompt shipment. Plant is strategically located . . . easy to reach by truck from major highways.

Winchester Division joins Bundy's other production and fabrication plants to give you low-cost, blueprint-to-assembly service on whatever you need in small-diameter tubing or fabricated tubing parts. Find out how *you* profit from Bundy's growth. Call, write, or wire us today.

BUNDY TUBING COMPANY, DETROIT 14, MICHIGAN

WORLD'S LARGEST PRODUCER OF SMALL-DIAMETER TUBING • AFFILIATED PLANTS IN AUSTRALIA, ENGLAND, FRANCE, GERMANY, AND ITALY

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CALENDAR

OF COMING SHOWS AND MEETINGS

1958

Chicago Automobile Show, International Amphitheatre, Chicago, Ill. .....Jan. 4-12

SAE Annual Meeting and Engineering Display, Sheraton-Cadillac and Statler Hotels, Detroit, Mich. .....Jan. 13-17

National Motor Boat Show, Coliseum, New York, N. Y.....Jan. 17-26

Truck-Trailer Manufacturers Association, annual convention, Palm Beach Biltmore, Palm Beach, Fla. .....Jan. 20-22

Plant Maintenance and Engineering Show, International Amphitheatre, Chicago, Ill. .....Jan. 27-30

Instrument Society of America, national conference on chemical and petroleum instrumentation, Wilmington, Del. .....Feb. 3-4

Automotive Accessories Manufacturers of America Exposition, Navy Pier, Chicago, Ill.....Feb. 3-6

Reinforced Plastics Division of Society of Plastics Industry, Inc., annual technical and management conference, Edgewater Beach Hotel, Chicago, Ill....Feb. 4-6

American Society for Quality Control, Administrative Applications Div. annual conference, Carter Hotel, Cleveland, O...Feb. 7-8

Motor and Equipment Wholesalers Association, national convention, Statler Hotel, Los Angeles, Calif. .....Feb. 18-19

Pacific Automotive Show, Pan Pacific Auditorium, Los Angeles, Calif. .....Feb. 20-23

Leipzig Spring Fair, Leipzig, Germany .....Mar. 2-11

ASME Gas Turbine Power Div. Conference and Exhibit, Shoreham Hotel, Washington, D. C. Mar. 3-6

SAE Passenger Car, Body and Materials Meeting, Sheraton-Cadillac Hotel, Detroit, Mich.....Mar. 4-6

Instrument Society of America, Pittsburgh Section Annual Conference on Instrumentation for Iron and Steel Industry, Roosevelt Hotel, Pittsburgh, Pa..Mar. 11-13

Steel Founders' Society of America, annual meeting, Drake Hotel, Chicago, Ill. .....Mar. 17-18

International Atomic Exposition, Inc., International Amphitheatre, Chicago, Ill. .....Mar. 17-21

SAE Production Meeting and Forum, Drake Hotel, Chicago, Ill. .....Mar. 31-Apr. 2

International Automobile Show, N. Y. Coliseum, New York, N. Y. .....Apr. 5-13

American Welding Society Show and annual technical meeting, Kiel Auditorium and Hotel Statler, St. Louis, Mo. .....Apr. 14-18

American Society for Metals, Southwest Metal Exposition and Congress, Dallas, Tex. .....May 12-16

Sigma Welding
gets truck trailers on the road fast

High-speed production of aluminum truck trailers calls for fast and efficient methods of welding. LINDE's Sigma Equipment and LINDE Argon keep trailer production lines rolling.

LINDE Apparatus for Sigma welding makes top-quality joints in all commercial metals. Production speeds up to 100 inches per minute are easily obtained, with clean, smooth welds. LINDE Argon, guaranteed 99.99% pure, is used to shield the arc. It's readily available in cylinders or in bulk, from convenient sources all over the nation.

Find out how LINDE Sigma Apparatus and LINDE Argon can help improve your product and increase your production. For a free copy of the booklet, "Modern Methods of Joining Metals," address Dept. H-15, LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. *In Canada:* Linde Company, Division of Union Carbide Canada Limited.

Sigma welding, with LINDE Apparatus and LINDE Argon, makes possible high-speed production welding of aluminum and other commercial metals, manually or automatically.

FOR THE BEST IN ELECTRIC WELDING—LOOK TO LINDE!

Linde TRADE MARK

UNION CARBIDE

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Planning for tomorrow • Producing for today!

For a third of a century Bendix Products Division has demonstrated time after time its ability to not only meet current production demands, but to actually anticipate future automotive requirements.

For example, Bendix* Power Braking and Power Steering are today two of the industry's most popular new car features because Bendix started planning them years ago.

Likewise, new products now being developed at Bendix Products Division may well be expected to make automotive headlines on future new car models.

That this Bendix program of constant progress will continue is a certainty because looking ahead plays such a very important part of the job at Bendix.

*REG. U. S. PAT. OFF.

BENDIX PRODUCTS DIVISION **SOUTH BEND** INDIANA

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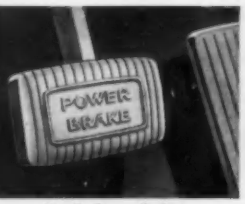
TYPICAL EXAMPLES



Bendix Power Brakes

Bendix Power Steering

Bendix Products Division

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High Spots of This Issue

▼ Automated Lines for Heat Treating Bearings

John Squire of Federal-Mogul Bower Bearings, Inc., describes how pushbutton automation has been achieved in the heat treating of roller bearing components. This totally mechanized setup has cut overall costs and improved product quality. Page 48.

▼ Effect of Air Springs on Car Chassis Design

This article explains the operating principles of the three major types of air suspension springs: the air spring, the air spring used as a helper spring only, and the air oil spring. Advantages of each type are discussed as well as promising areas of future development. Page 54.

▼ New Combustion Chamber Designs for 1958

This article reports on the latest advances in combustion chamber design, including the use of domed piston heads, fully machined combustion chambers, and flat cylinder heads with the bank faces of the cylinder block machined at an angle to the axis of the bore. Page 60.

▼ Bright Outlook for Stainless Steel

This analysis of stainless steel uses in the automotive industries includes a discussion of exterior trim applications in 1958 model cars as well as strictly mechanical uses. Also covered are applications in other fields, such as transportation, aircraft, and missiles. Page 62.

▼ New Transfer Machine Lines at Cadillac

Cadillac Motor Car Div. has installed new transfer machine lines for the cylinder block and cylinder head of the 1958 V-8 engine. The lines, described here, are completely interlocked to make the entire cycle completely automatic, from start to finish. Page 68.

▼ 43 New Product Items And Other High Spots, Such As

Forging of axle shafts; Turin Show; Redstone ballistic missile construction; British automatic drive for low-powered cars; descaling bath for titanium; and industry statistics.

AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

New facts on inventory costs revealed by IRON AGE survey

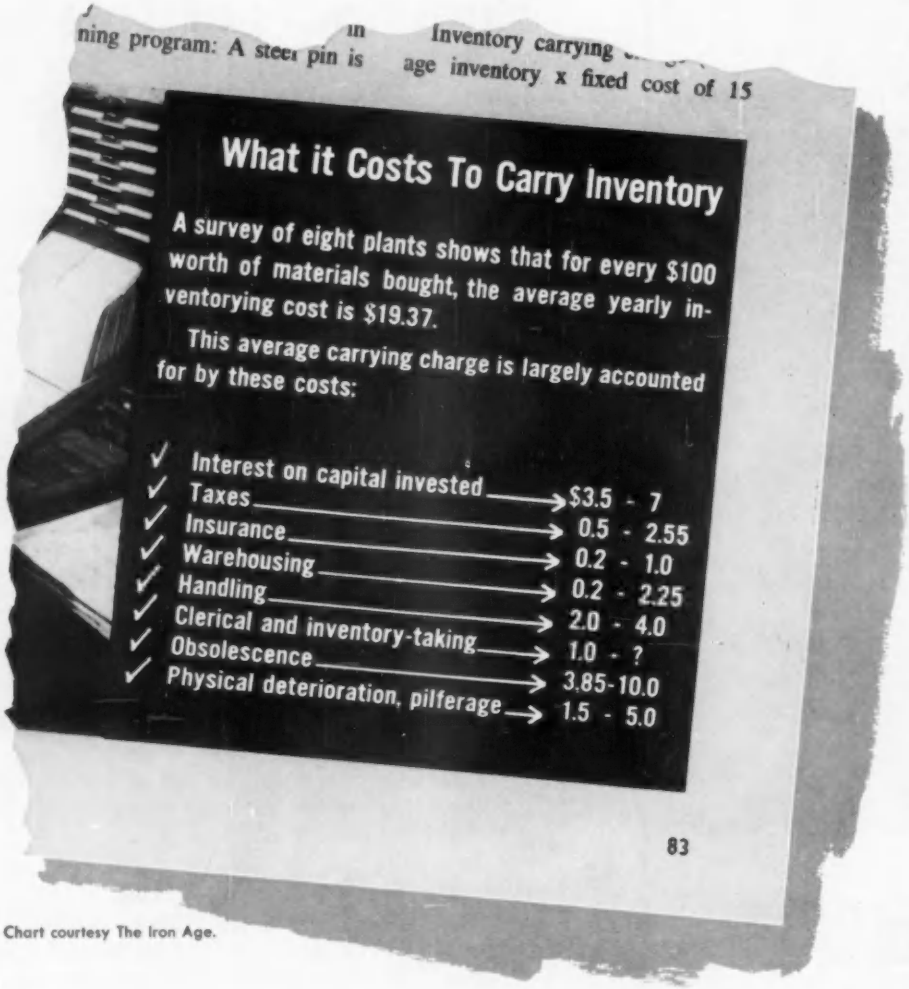

Chart courtesy The Iron Age.

Here's help on steel inventory costs . . . In these days when working capital is tight and interest rates are high, it's especially important not to let inventory take dollars you can use elsewhere. You can save money on steel inventory costs by letting Ryerson carry the inventory for you. It's already here, at Ryerson—in the nation's largest stocks of steel. And Ryerson has the organization to deliver what you want when you want it. For immediate steel service, call the Ryerson plant near you.

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Principal products: Carbon, alloy and stainless steel — bars, structurals, plates, sheets, tubing • aluminum, industrial plastics, machinery, tools, etc.

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News

OF THE AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 117, No. 12 **December 15, 1957**

Automobile Output Hits Peak, Then Drops As November Ends

Automobile production in U. S. plants hit a new peak for 1957 during the third week of November, then dropped sharply as Thanksgiving and strikes cut into working schedules.

December, however, started out on a more optimistic note with settlements of strikes at Ford and Chrysler Corp. plants, paving the way to full production.

For the week ending Nov. 23 output totaled 176,292 units, including 151,961 passenger cars and 24,231 trucks and buses. This was the highest week since January. All passenger car divisions except DeSoto and Edsel reported increases that week.

Production for the final week dropped, with DeSoto and Edsel again decreasing their output to adjust inventories.

The end of November saw settlement of a three-week strike at Ford's Louisville assembly plant and two-week strike at Chrysler Corp's Mound Road engine plant in Detroit. The Mound Road plant supplies engines to Plymouth Div., and the strike shut Plymouth's Detroit and Evansville assembly plants.

Both Detroit and Plymouth divisions were slated to reach full production during the first week of December.

Lincoln and Mercury Div. meanwhile planned a 68 per cent increase in production schedules for the Continental Mark III. Nine-hour workdays, plus some Saturday work during December, will bring about the increase, according to the division.

New Air Suspension Variation Will Be Introduced in 1958

Although all existing air suspension systems operate on the same basic principle, there are variations that set certain systems apart. Oldsmobile, for instance, has a sealed system that utilizes two storage tanks (high-and-low pressure) and recirculates exhausted air.

All other current systems have only one reservoir and must compress fresh air after exhausting. Other variations involve mainly differences in mounting, leveling valve location, and rear stabilization.

But 1958 will see another major variation not approached by any of the current systems. American Motors will introduce air suspension on its 108-in. and 117-in. wheelbase Ramblers on the rear wheels only, and use standard coil spring suspension on the front wheels.

Coil springs, however, will not be replaced on the AMC rear suspension. The new system will combine coil springs and air bags on the rear, giving the spring rate of steel coil springs and the constant level feature of air suspension. Bellows will be mounted inside the coils.

A similar rear-only system, combining coil springs and air bags, may appear at a later date on Chrysler Corp. cars.

PRESIDENT HARDTOP FEATURES LONG, LOW LINES

The 1958 Studebaker-Packard President two-door hardtop features a lowered flowing roof line reminiscent of the S-P Hawk. The car is powered by a 225-hp, 289 cu in. engine equipped with a four-barrel carburetor. Torque is 305 ft/lb at 3000 rpm, and compression ratio is 8.3 to 1. Length of wheelbase is 116.5 in.; overall length, 202.4 in.; and height, 57.25 in.

Esso Scientist Predicts New Multi-Synthetic Tires

Tires of the future may be a composite of several new synthetic rubbers, leading to revolutionary concepts in tire making, according to Dr. William J. Sparks, of Esso Research and Engineering Co.

Dr. Sparks predicts that new synthetics will be developed that are tailor-made for each tire part—tread, sidewalls, beads, and plies. Such a multi-synthetic tire, he said, would have much greater resistance to abrasion, heat, and chemical attack.

Dr. Sparks said that the new synthetic rubbers would be similar to butyl in chemical makeup and will lend themselves to vulcanization through agents other than sulfur.

Dr. Sparks, co-inventor of butyl, made these comments before a gathering of scientists at the Instituto di Chimica Industriale, in Milan, Italy.

NEWS AUTOMOTIVE AND AVIATION

FACEL-VEGA UNVEILS FOUR-DOOR LUXURY SEDAN

The elegant four-door Facel-Vega Excellence is powered by a specially made Chrysler Typhoon V-8, 360-hp engine, and has a Chrysler automatic transmission. The Facel-built chassis has a frame made of steel-welded tubes, with independent coil springs in the front suspension, and front and rear shock absorbers. It has an overall length of 20.67 in.; height, 54.5 in.; and wheelbase, 124.8 in. Price is $12,800, f. o. b. New York.

Fisher Body Employs Hi-Fi To Track Down Car Noises

Fisher Body Div. of General Motors Corp. is using some of the tools of the music recording industry to track down strange body noises in 1958 GM cars.

Stereophonic tape recorders, binaural reproduction and high-fidelity performance have proved valuable to Fisher Body engineers in detecting and eliminating troublesome and unnecessary noises hidden in remote places in the car body.

At the GM proving grounds, cars are put through tests not only to locate the source of sounds, but also to evaluate the effectiveness of the 23 different sound deadening materials used in a typical GM car.

In the binaural method, two highly sensitive microphones are used to record, through separate channels, on two hi-fi tape recorders. This is particularly valuable in judging the effectiveness of cowl insulation against engine noises. Road noises are picked up by microphones inside the test car, relayed to a trailing station wagon, and recorded.

Fisher Body engineers have found that electronic sound detection is particularly valuable in tracing the true source of a sound that is deflected to another area of the car.

GOLIATH TIGER IS LATEST ENTRY IN SMALL CAR MARKET

The Goliath Tiger, Germany's newest entry in the American small car market, is powered by a four-cylinder, 66.73 cu in. engine that develops 46 bhp at 4250 rpm. It is built on an 89.4-in. wheelbase, has an overall length of 159.8 in. and height of 57.1 in. The entire Goliath line will be available in the U. S. in spring of 1958.

Output of Car Compressors Hits New Peak During 1957

Production of automotive air conditioning compressors in U. S. plants in 1957 is about double that of last year, according to reports presented at the Air-Conditioning and Refrigeration Institute meeting in Chicago last month. This is in sharp contrast to production figures for all types of compressor bodies, which were slightly off compared with 1956.

For the first half of the year, the institute reports, overall shipments of all types of compressor bodies—excepting those for use in household refrigerators—were about 3 per cent below shipments for the like period in 1956. Sharp increases were noted, however, for one and two-horsepower compressors, as well as for automotive air conditioning compressors.

For the first six months of 1957, shipments of automotive air conditioning compressors totaled 302,502, compared with 167,487 for the like period in 1956. For the first eight months of this year, 366,204 automotive units were shipped, compared with 205,710 for the same period in 1956.

General Motors Optimistic About Canadian Economy

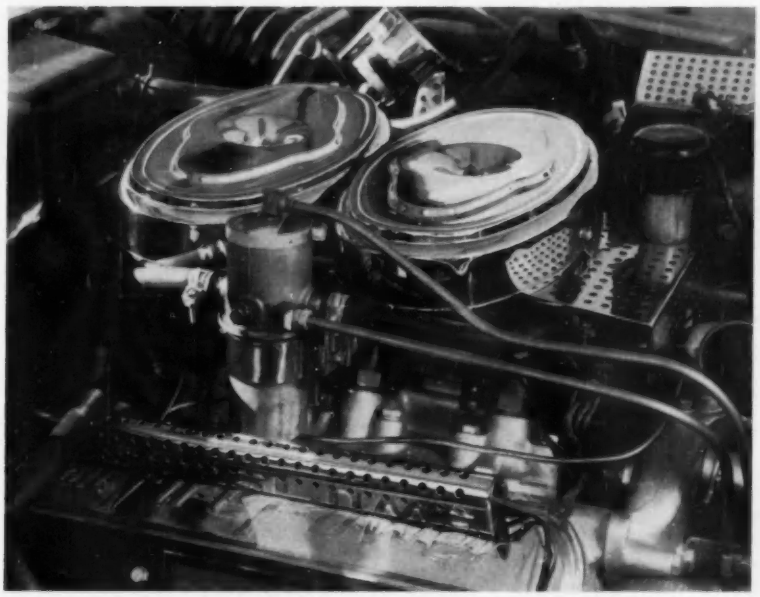
General Motors of Canada has confidence in the soundness of the Canadian economy, and has reflected this attitude by adding 21 acres of new shop and warehouse space to its Canadian plants in the past two years.

This comment was made by H. E. Walker, president and general manager of the company, at Toronto, recently.

Mr. Walker also pointed out that until the last week of November, GM's main plant at Oshawa, Ontario, was working two full shifts per day to meet demand for 1958 models.

In connection with GM's motorama at Toronto during the first week in December, Mr. Walker stated that "our tooling bill in Canada for our 1958 models is the largest in our history by a margin of several million dollars. Our estimated sales forecasts," he added, "are also the largest."

Mr. Walker also announced that the British-built Vauxhall Victor would soon be available in quantity for Canadian buyers. "We feel confident," he said, "that the Victor is the answer to the demand for a smaller second car. It has desirable features of North American design, such as panoramic windshield, sleek body styling, and roominess."



Bendix electronic fuel injection system installed in Chrysler 300D.

1958 Chrysler 300D Offers Electronic Fuel Injection

The 1958 Chrysler 300D, which was unveiled Dec. 5, offers a Bendix electronic fuel injection system as optional equipment (see illustration). It boosts output of the 392 cu-in. engine to 390 bhp at 5200 rpm.

Horsepower of the standard FirePower engine is 380. Compression ratio is 10 to 1, and valves and tappets are mechanically actuated. Two four-barrel carburetors are standard equipment.

The 300D, a limited production model, has a 126-in. wheelbase and measures 220.2 in. overall and 55.2 in. in height. A special high-rate torsion bar front suspension enables extra-flat cornering and almost dip-free braking, according to Chrysler Div. Power steering, power brakes and TorqueFlite transmission are standard equipment on the 300D.

Ford Using White Brass Plating At New Monroe Bumper Facility

Ford Motor Company is using a white brass plating process at its new bumper manufacturing facilities at Monroe, Mich. Full-scale bumper production at the expanded Monroe plant began with 1958 model output.

The plant has two rack-type plating machines, each more than 700 ft. long to handle the bumpers. Each machine processes 35 racks of bumpers an hour through 10 stages of a 3½ hour plating cycle.

Ford ran an experimental line with the new plating process for 18 months before full-scale production began. The white brass plating is said to give a more uniform plating distribution.

In addition to stamping and plating bumpers, the Ford Monroe plant also produces wheels, stabilizer bars, hubcaps, bumper arms, coil springs and lamp housings for passenger cars and trucks.

S-P Taxicab Is Designed For Economy of Operation

Studebaker-Packard Corp. has introduced into its 1958 line of vehicles a new Econ-O-Miler taxicab with a President body shell. The heavy-duty chassis is built of various components used throughout the S-P passenger car line.

Power plant is the six-cylinder 185 cu in. engine that is standard on the Scotsman, Champion, and Silver Hawk Six models. A special Carter carburetor with a one-in. venturi provides greater economy. Standard manual transmission incorporates spur gears for taxi use, and a water-cooled automatic transmission is available as optional equipment.

The company now has the new cabs operating in 39 cities across the U. S. Field reports have indicated that in some areas fleet operators are getting 12 mpg on models equipped with the special carburetor and automatic transmission.

Studebaker-Packard estimates that its new taxi has a yearly sales potential of 10,000 units out of a total estimated market of 45,000 cabs bought annually for replacement purposes. Current basic suggested list price of the S-P cab is $1972.

Citroen Boosts Output For U. S. Car Market

S. A. Andre Citroen, France's largest independent automobile manufacturer, has increased production for the U. S. market by 25 per cent, according to Citroen Cars Corp., American affiliate.

The increase in output for shipment is expected to cut delivery time for the Citroen DS-19 to thirty days, as compared with a 60-day to 6 month wait on all U. S. orders since the car was introduced in this country two years ago.

Citroen, with American headquarters in New York City, now has seven other distributors in key markets and over 100 dealers and service parts centers throughout the U. S.

PLATING PROCESS

Bumpers are about to be submerged into a chemical bath in one stage of the electroplating process used at Ford Motor Co. Monroe plant. Bumpers are plated not only with copper, nickel, and chromium, but also with white brass—said to be the first such use of the material in the automotive industry.

News AUTOMOTIVE AND AVIATION

Eldorado Biarritz convertible features completely automatic top

Jaguar Cars Unveils Its 1958 Line in U.S.

Jaguar Cars has unveiled four of its 1958 line of cars in Jaguar showrooms throughout the U. S.

The new Jaguars include the Three-Point-Four sports sedan, the XK-150 sports convertible and sports hardtop coupe, and the Mark III sedan.

The Three-Point-Four sedan and both XK models feature four-wheel disk brakes and are available with automatic or manual transmission. The Three-Point-Four is powered by the Jaguar XK 6-cylinder, twin overhead camshaft engine, which develops 210 hp. The XK models are powered by the Jaguar XK racing engine, now equipped with B-type head for higher output rating.

Engineering changes on the Mark III include a new-type cylinder head, new S.U. twin carburetors and induction system, and twin exhausts.

Prices of the 1958 line range from $4,460 to $5,695.

GM's Wilmington BOP Plant Assembles Millionth Vehicle

The General Motors B-O-P assembly plant at Wilmington, Del., this month produced its millionth car since it began operations in 1947. The record vehicle was a 1958 Buick.

BRITISH CONVERTIBLE

The 1958 British-built Morris-1000 four-passenger convertible is built on an 86-in wheelbase and is powered by a 58-cu in. overhead valve engine that develops 37 bhp at 4800 rpm. The entire Morris-1000 line, including two- and four-door sedans and a station wagon is imported into the U. S. by Hambro Automotive Corp.

Cadillac Showing Convertible With Completely Automatic Top

Cadillac Div. is displaying five specially-made Eldorado Biarritz convertibles with completely automatic tops that hide under all metal panels flush with the rear deck. Four electric motors operate the top and the three sections of the boot panel.

A humidity control actuates the motor to raise the top when it rains. Otherwise the action is started with a single push button. The five cars were built strictly for show purposes and will not be sold.

New Diesel Outboard Motor To Be Unveiled at Coliseum

A recent development in low-cost power for small boats—a lightweight 7½ hp Diesel outboard engine—will be on display for the first time at the 48th annual National Motor Boat Show in the New York Coliseum, Jan. 17-26.

The new outboard, a two-stroke, self-scavenging engine, has a novel arrangement of two opposed-firing pistons in a single cylinder. The unit is manufactured by American M.A.R.C. Inc., Inglewood, Calif.

New Rambler Will Make Bow At Chicago Automobile Show

American Motors 100-in. wheelbase Rambler American will make its first public appearance at the 1958 Chicago Automobile Show, Jan. 4-11. The car will go on sale during January.

The short Rambler and the Ford Thunderbird are the last of the scheduled 1958 passenger car models to make their appearance. The Thunderbird also is scheduled for sale in late January.

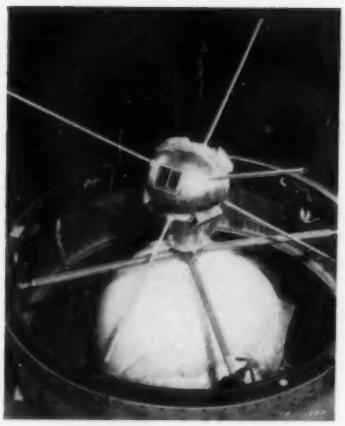
Hardening Process Speeded Up At Monroe Auto Equipment Co.

Hardening of shock absorber shafts has been speeded up at the Monroe Auto Equipment plant, at Hartwell, Ga., by the use of three General Electric 40-kw induction heaters on an almost completely automated assembly line.

The new equipment, which hardens about 500 shock absorber shafts per hour, requires less floor space and manpower than was needed when the chrome plating process was used, the company said.

The production line requires only one operator to feed stock into the screw machine at one end and an operator to check finished parts as they come off the lapping machine.

AI TABLOID



BABY SATELLITE

A model of 6.4 in. baby satellite weighing 4 lb is perched atop a simulated third stage rocket motor in the top of the 72-ft Vanguard earth satellite launching rocket in Martin Co. test tower. Flexible cross bars between satellite and rocket gives support to the third-stage engine before it is spun up and ejected from the burned out second stage.

GM Vice-President Says Selling Is Primary Problem of Industry

General Motors vice-president William F. Hufstader says that effective selling is the principal problem facing the automobile industry today.

Speaking before the Utah Automobile Dealers Association, Mr. Hufstader said that the industry has not fully adjusted to the change which took place in 1953, when the automobile picture switched from a buyers' to a sellers' market. He said that today the industry sells its wares on a "quick-lunch" counter basis when it should be on a "banquet" basis.

AMC Will Get Advice of Clergy In 1958 Contract Negotiations

American Motors will try a new approach to collective bargaining for renewal of its contract with the UAW. AMC has acquired the services of 10 leading clergymen to give guidance on the "ethical aspects" of bargaining sessions and contract terms.

AMC's current contract expires June 15, 1958.

Edward L. Cushman, vice president in charge of industrial relations for the company, said that collective bargaining decisions should recognize human values as well as economic realities. The advice of these clergymen, he added, will be helpful in weighing conflicting human values.

The first primary aluminum has been poured at Kaiser Aluminum & Chemical Corp's new plant at Ravenswood, W. Va.

* * *

Bendix Radio Div. of Bendix Aviation Corp. announces that it is expanding its automotive product line and is ready for practically any new automotive business from complete accessories to their components.

* * *

Vacuum Equipment Div. of F. J. Stokes Corp. will build a dual chamber vacuum stream degassing system for Erie Forge & Steel Corp. and install it as part of the electric and open hearth furnaces at the company's Erie, Pa., plant.

* * *

Hercules Motors Corp. will take over the manufacture of two Lycoming aircooled industrial engines from Lycoming Div., Avco Mfg. Corp. Engines are a 2-cylinder inline model with 30-hp continuous rating and a 4-cylinder V-type with 70-hp continuous rating.

* * *

Brown Instruments Div. of Minneapolis-Honeywell Regulator Co. reports that it has supplied instrumentation for France's huge plutonium extraction plant—scheduled for full operation in 1958—and will also supply automatic controls for nuclear research reactors being built by American companies for Technical University of Munich and Italian National Committee for Nuclear Research at Ispra, Italy.

* * *

Wing-Stay T, described as a new non-staining, non-discoloring, rubber antioxidant, has been developed by Goodyear Tire & Rubber Co. Tests reveal, according to the company, that rubber samples with Wing-Stay T resisted window aging for a 12-week period and showed more than 81 per cent tensile retention after 18-day aging in a 50 C oxygen bomb under 150 psi pressure.

* * *

Armstrong Cork Co. has formed a new subsidiary, known as Armstrong Contracting and Supply Corp., to handle all contracting operations now carried on by its Insulation Div.

A jet vane made of laminated fiberglass reinforced with phenolic resin has been successfully tested in the rocket blast of a missile, according to American Aerophysics Corp. The company says that unusual resistance to the effects of rocket blast was obtained by placing the laminates with their edges sloped in the direction of the jet stream, instead of in parallel.

* * *

By adding aluminum to iron, Ford scientists have created an alloy whose magnetic properties decrease, instead of increase, at low temperatures. Since the addition of aluminum to iron creates an alloy that is also noncorrosive, this discovery, they state, may be an important clue pointing to a close relationship between rusting and magnetism.

* * *

Plans have been announced for a new $10 million United Engineering Center to be erected on United Nations Plaza, New York City. The new Center, which will replace the present Engineering Societies Building, will be the headquarters of 16 National Engineering Societies with a total membership of about 250,000 engineers.

* * *

Aluminum Co. of America is installing a new laboratory at its Chicago works that will function as a section of the Cleveland Research Div. of Alcoa Research Laboratories. The new facility will be equipped for full-scale pilot operations, enabling researchers to study die casting processes under production conditions.

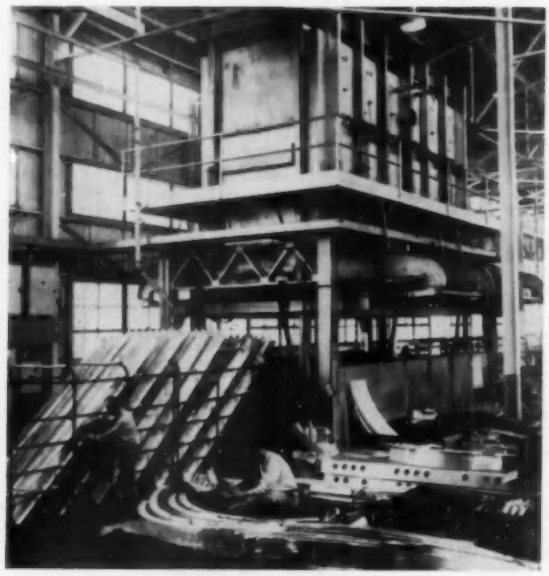
* * *

Harvey Aluminum has added magnesium forgings to the commodity line of wrought mill products produced at its Torrance, Calif., plant. The company's development and production work with magnesium die and hand forgings is aimed at both military and commercial markets.

* * *

Dresser Industries, Inc., has agreed to buy Gardner-Denver Co., subject to stockholders' approval. The combined companies have sales volume of about $350 million a year and total assets of about $250 million.

AVIATION MANUFACTURING



ELEVATOR FURNACE

An electric elevator furnace, equipped with an automatic elevator quench, has speeded the quenching process at Boeing Airplane Co., Seattle, Wash., plant. The elevator transfers the load from furnace to quench in just seven seconds. Furnace has four zones, handles a 4000 lb charge at 1000 F maximum operating temperature. Temperature variation throughout the load is 10 F or less after stabilization at control temperature. Loads of coiled 24S aluminum alloy sheet material as large as 6 ft wide and 12 ft long are processed in the furnace. Unit was designed and built by General Electric Co., Industrial Heating Department.

New AF Extrusion Process Cuts Costs by 40 Per Cent

Development of a new technique for extruding titanium jet engine parts directly from cast ingots has reduced the cost of finished parts as much as 40 per cent, according to a joint announcement made by Curtiss-Wright Corp. and the Air Materiel Command.

The new technique was developed after two years of research under an Air Force program sponsored by the Manufacturing Methods Branch, Headquarters AMC.

Curtiss-Wright officials say that the cast ingot extrusion method is less costly because it requires less raw material and also because cast ingots cost about half as much as forged billets.

The advantages of the new technique were demonstrated, Curtiss-Wright officials said, in the production of annular rings of unalloyed and alloyed titanium and of a tubular shaft of alloyed titanium. Under the new method, annular rings are manufactured by extruding the basic cross section, contour forming, welding of the cross sections in rings, and machining to finished dimension. The tubular shaft is fabricated by extruding the tubular section, upsetting the ends for desired shape, and then machining to the required dimension.

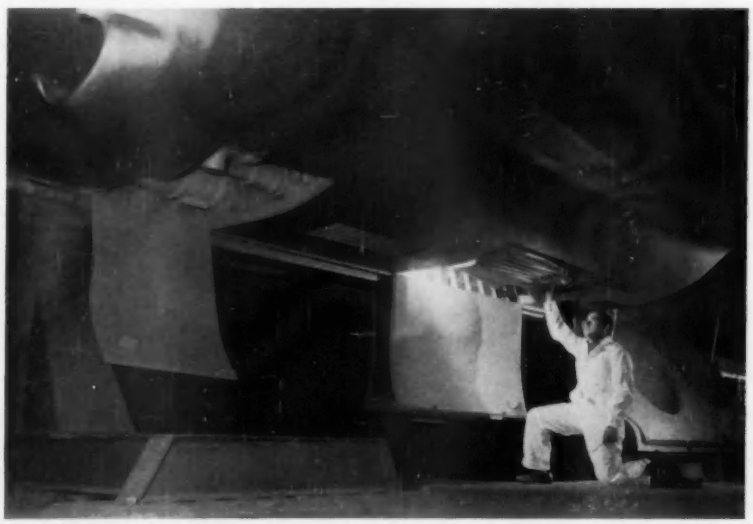
The new methods were developed at the Metals Processing Div. of Curtiss-Wright Corp.

Midget Rocket Motors Used To Simulate ICBM Flight

Midget rocket motors mounted in vacuum chamber are helping engineers at Convair Div. of General Dynamics Corp. to determine what happens when an ICBM is launched through space.

The Convair Thermodynamics Laboratory duplicates altitude conditions up to about 40 miles in a cylindrical, steel vacuum tank 6 ft in diameter and 10 ft long.

A miniature test rocket, fueled by gaseous oxygen and gasoline, is extended into one end of the tank and fired for as long as 1.5 seconds. By placing material specimens in or near the jet, engineers can determine how the 5000 F flame affects such surfaces, as atmospheric pressure is reduced, and predict rocket exhaust characteristics at even higher altitudes.



CONVAIR'S FREON SYSTEM CAN BE REMOVED EASILY

Maintenance and servicing of the Freon system used in air conditioning the Convair 880 jet transport have been simplified by engineers at Hamilton Standard Div. of United Aircraft Corp. Here a workman demonstrates on a full-scale wooden mockup how the Freon condenser unit can be removed simply by taking out three bolts and disconnecting three ducts.

Laboratory engineers are also installing a hypersonic wind tunnel, in which rocket models up to 3 in. in diameter can be tested. To create the desired hypersonic speed and high altitude conditions, high-pressure helium is expanded through a nozzle and passed through a test section containing the scale model rockets. Helium flow in this tunnel will approach a velocity of Mach 15 (9000 to 10,500 mph) and an altitude of 30 miles.

USAF Procurement Chief Cites Present Need for Beryllium

Beryllium may be the answer to many of our problems in the missiles field, if some of its present disadvantages can be overcome, says Maj. Gen. William O. Senter, USAF procurement chief at Air Materiel Command headquarters, Dayton, O.

Beryllium, according to General Senter, is six times stronger than steel on a strength to weight basis, weighs about a third as much as aluminum, and can withstand temperatures of 1200 F. If the metal were used in an intercontinental ballistic missile, the general says, the vehicle could be fired into outer space miles above its presently designed altitude, using today's power plants.

Beryllium is not being used industrially now, according to Senter, because of its high cost ($200 a pound) and also because it is highly toxic as well as abrasive to all known cutting tool materials.

North American Net, Sales Establish New Peak in '57

Sales and earning of North American Aviation, Inc., reached new highs in the fiscal year ended Sept. 30, J. H. Kindelberger, chairman, reported.

Net sales rose to $1,243,767,483 from the previous peak, set in 1956, of $913,981,913. Net income totaled $33,864,462, against a net of $28,760,962 in the previous fiscal year.

Mr. Kindelberger noted that this was the tenth year in a row of increased sales and the first year in which volume exceeded the billion-dollar mark. He estimated that sales in the present fiscal year may drop to about $700 million because of the termination of the Navaho missile program and declining schedules in other programs.

North American's backlog of unfilled orders total $581 million, the lowest since 1951. This compares with $1,285,000,000 a year earlier. Including orders not yet funded but still in the negotiation stage, the current backlog total is $918 million.

CESSNA 172 FEATURES MAJOR STYLING CHANGES

Cessna Aircraft Co.'s Model 172 is an all-metal high-wing four-place business airplane in the low-price class. It is powered by a 145-hp Continental engine, and equipped with wide-span Land-O-Matic gear. The 1958 model features major interior and exterior styling changes as well as an improved landing gear, which increases ease of handling and ground stability.

F-107 JET FIGHTER TO UNDERGO RESEARCH TESTING

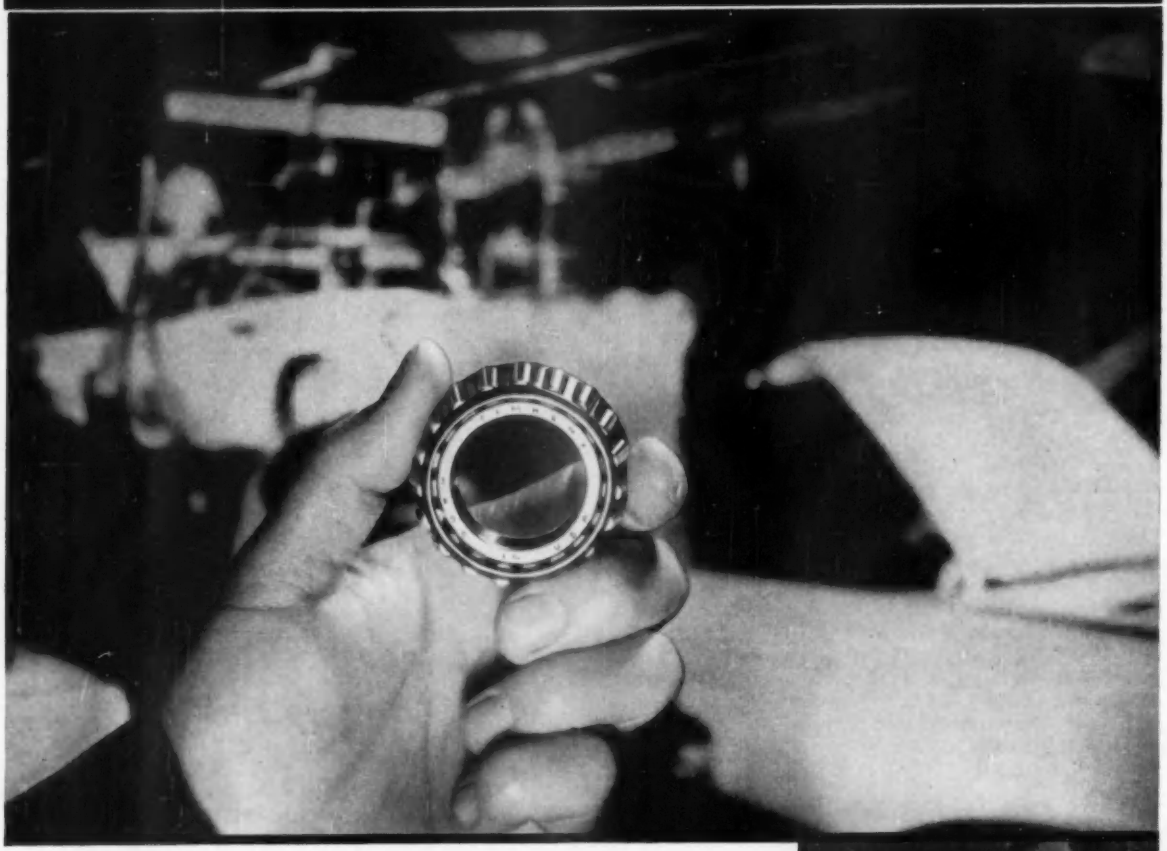
North American F-107 single engine jet fighter has been turned over to the National Advisory Committee for Aeronautics at Edwards Air Force Base, Calif., for research testing. F-107 is capable of flying twice the speed of sound. It is powered by Pratt & Whitney J75, which develops more than 15,000 lb thrust.

KAMAN AIRCRAFT EXHIBITS NAVY UTILITY HELICOPTER

Kaman Aircraft Corp. recently unveiled a full-scale mockup of its HU2K-1 utility helicopter at the company plant in Bloomfield, Conn. Chosen for its design by the Navy Bureau of Aeronautics in competition with other utility helicopters, the HU2K will be powered by a General Electric T-58 gas turbine.

Meeting the big change in cars with the big change in bearings:

TIMKEN® and The Moto-Mated Way



Now you get a better bearing at a saving

LONGER, lower, sleeker, faster, more powerful cars are revolutionizing the automobile industry. And the new cars coming off the production line (above), place new and greater demands on component parts. Meeting the big change in cars is the big change in bearings—Timken and the Moto-Mated Way. It's a whole new concept in bearing design, manufacture and supply—*mated* to the needs of the dynamic automotive industry.

From the Moto-Mated Way comes a new breed of Timken® tapered roller bearings in standardized sizes. New, lighter bearings to reduce unsprung weight. Smaller bearings that save space—permit more compact design. Bearings that are capacity packed to take the increasing loads of driving today's powerful cars.

And because they are produced by machinery and methods revolutionary in the bearing industry, the new bearings cost less. They give automakers an area of economy in their otherwise spiraling manufacturing cost.

Carmakers have already saved in bearing costs by using the new Timken Moto-Mated bearings in front wheels and other applications. As you standardize on fewer Moto-Mated sizes for wheels, pinion and differential and as your use of the new bearings grows, we can pass still further manufacturing savings along to you.

Whether you're designers, production engineers or purchasing men, now, more than ever, Timken bearings are your No. 1 value. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

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MEN IN THE NEWS

Monroe Auto Equipment Co.—J. E. Bickel was made vice-president in charge of merchandising.

North American Aviation, Inc. — **Leland R. Taylor, Joseph G. Beerer, John R. Moore,** and **Samuel K. Hoffman** have been elected vice-presidents.

Kiekhaefer Corp.—**Thomas B. King** was elected a vice-president.

Aerobilt Bodies, Inc.—**Fred L. Hall** has been named general sales manager.

Borg-Warner Corp., Byron Jackson Div.—**Jesse T. Berger** was appointed director of industrial relations.

National Automatic Tool Co., Inc.—**John R. Keates** has been appointed general sales manager of the Machine Tool Div.

Budd Co., Nuclear Systems Div.—**Arthur L. Krasnow** has become sales manager, Eastern Region.

Chrysler Corp., Stamping Div.—**William G. Martin** was named divisional industrial engineer; **John E. Carmichael,** director—personnel; and **Charles C. Mezey,** plant manager of the Nine Mile Press plant.

Bendix Aviation Corp. — **G. H. Brower** has been promoted to chief engineer for custom automotive products at Bendix Radio Div.

Federal-Mogul-Bower Bearings, Inc.—**Robert C. Carson** has been promoted to director of purchases of the Federal-Mogul Div. and **Walter T. Camp** was named general manager, Arrowhead Products Div.

Clearing Machine Corp.—Ervin J. Baumrucker has been appointed vice-president in charge of domestic press sales.

Tuthill Spring Co.—Logan E. Tuthill has been named executive vice-president, and Werner F. Fischer succeeds him as secretary.

General Electric Co.—**Loyd C. Smith** has been named manager of military engine sales for the Production Engine Dept.

Norton Co.—**Hugh A. Allen** has become traffic manager, succeeding **Frederick D. Wilson,** retired.

Tung-Sol Electric Inc.—**John M. Malone** has been named assistant general sales manager.

General Motors Corp., New Departure Div.—**C. Frederick Crow** has become Bristol plant manager, succeeding **Robert H. Wilkie.**

Bendix Aviation Corp., Utica Div.—**Robert S. Kinsey** was named director of engineering.

Dunlop Tire & Rubber Corp.—**William H. MacKay** has been appointed vice-president of industrial and public relations.

Dow Chemical Corp.—**Frank W. Larabee** has become manager of the solvents section of the chlor-alkali sales organization.

Edsel Div. Ford Motor Co.—**Laird Anderson** has been appointed manager of manufacturing planning and production engineering.

U. S. Rubber Co.—**Joseph L. Pert** was appointed sales manager of Ensolite and Ensolex.

Milford Rivet & Machine Co.—V. L. Bradford has become president, succeeding F. H. Merwin who is now chairman of the board.

Electric Auto-Lite Co. — Robert Twells was named group executive in charge of the Spark Plug Div.

Trecker Aircraft Corp.—**Hugh L. Gillham** has been appointed chief engineer.

Sharon Steel Corp.—**Severn W. Kittredge** was named assistant chief engineer.

Square D Co.—**Paul A. Christenson** is now works manager of the industrial controller division.

Chrysler Div., Chrysler Corp.—**Keith R. Matzinger** has been appointed sales promotion manager.

Joseph T. Ryerson & Son, Inc.—**Joseph D. Gavin** was named manager of sheet and strip sales at the Chicago plant.

Bell Aircraft Co.—**Walter R. Dornberger** has been named technical assistant to the president.

Necrology

Herman L. Moekle, 72, retired Ford Motor Co. vice-president, died Nov. 23, at Detroit, Mich.

Johann M. Fischer, 71, Diesel engine designer, died Nov. 16, at Racine, Wis.

Patrick J. Shouvlin, former Springfield, O., industrialist who pioneered in the development of the internal combustion engine, died Nov. 25.

Richard V. Werner, 80, a founder of Hein-Werner Corp., Waukesha, Wis., died Nov. 19.

Roy I. MacArthur, 64, Buick Div. general superintendent, died recently, at Flint, Mich.

Samuel W. Rapp, 75, an inventor who helped develop the present-day spark plug, died Nov. 19, at Milwaukee, Wis.

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TO CONVERT THIS NEW WESTINGHOUSE COMBINATION LINESTARTER FROM NON-FUSED TO FUSED!

or change fuse clip ratings from 30 to 400 amp

This is flexibility!

This is the new Westinghouse combination Life-Linestarter® with the Visi-Flex switch! . . . the convertible switch that enables you to modify the new Westinghouse combination linestarters (in sizes 0 through 4) to meet both your present and future power requirements by simply adding or changing a set of fuse clips.

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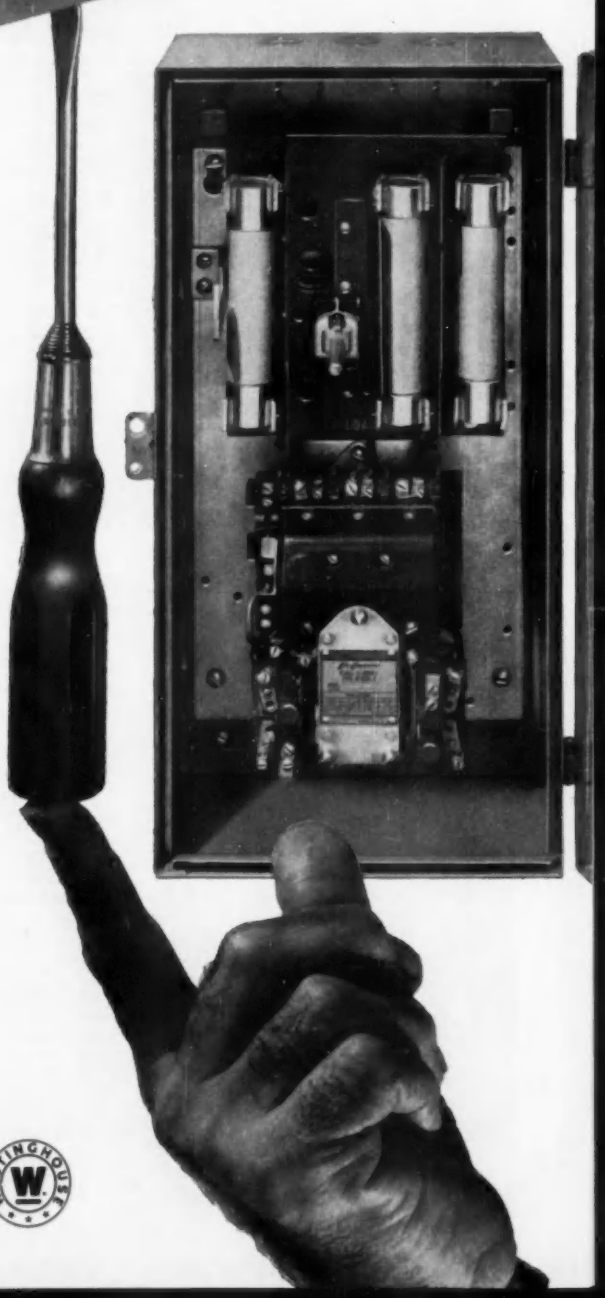
What's more, the new Westinghouse Life-Linestarters with Visi-Flex switch are up to 25% smaller than the old design—good news for plant engineers with a space problem.

For plants which face adverse operating conditions involving lint, dust, or oil seepage, the new linestarters are available in the NEMA-12 dust-tight enclosure, as well as the standard NEMA-1 shown at right. And—they're available *now*, from local warehouse stocks. Simply call your nearby Westinghouse sales office or distributor. J 30284



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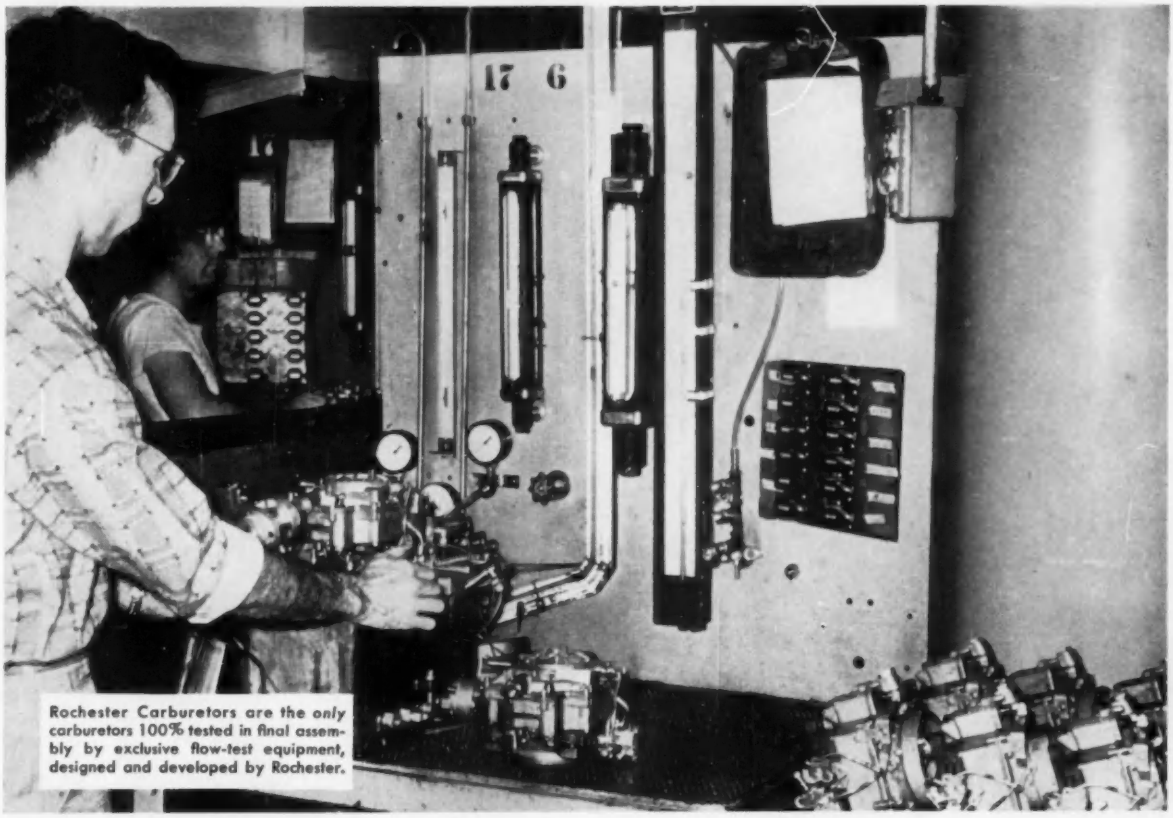

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Rochester Carburetors pass the highest standards of quality in the industry. For example, only Rochester puts *all* finished assemblies to a flow test, under simulated driving conditions, to assure dependable performance. In addition, all castings of 4-jet air horns, float bowls and throttle bodies are scrubbed clean by Rochester's exclusive circular index washers to eliminate impurities. And Rochester requires an air test of *all* bowls, main metering jets, idle tubes, power restrictions and venturi clusters. These *extra* precautions—standard procedure at Rochester—are your assurance that Rochester Carburetors are the best way to drive home a powerful performance story to your customers. Rochester Products Division of General Motors, Rochester, N. Y.

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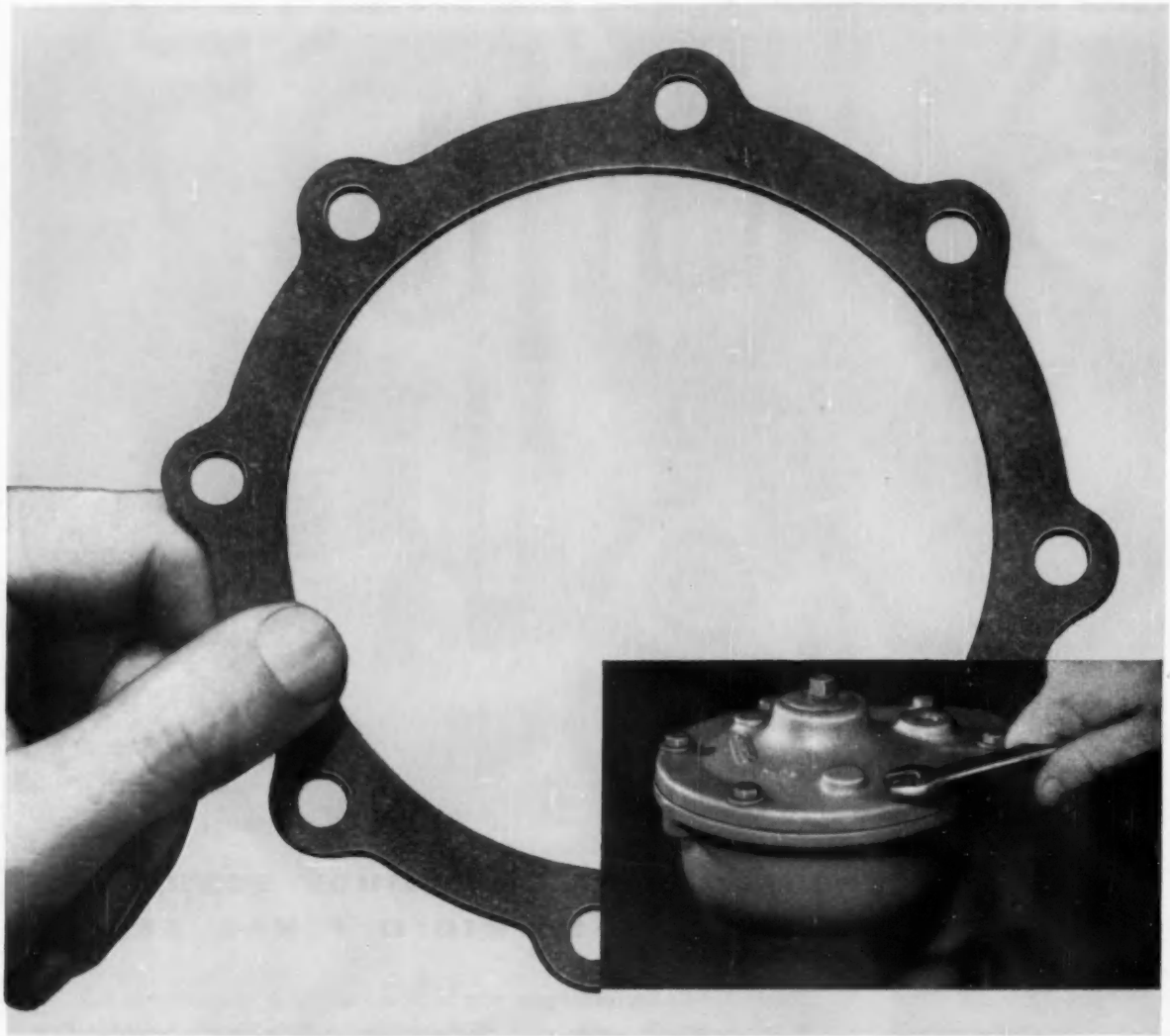
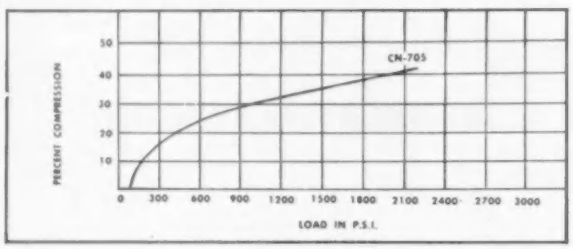


Accopac fiber gasket seals hot oil at low flange pressures

Armstrong CN-705 Accopac®—an improved beater-saturated gasket material—will seal hot oil under relatively low pressures, even where flange temperatures go as high as 300° F. Under these conditions, ordinary plant-fiber materials often shrink and leak because their saturant is removed by the leaching action of the hot oil.



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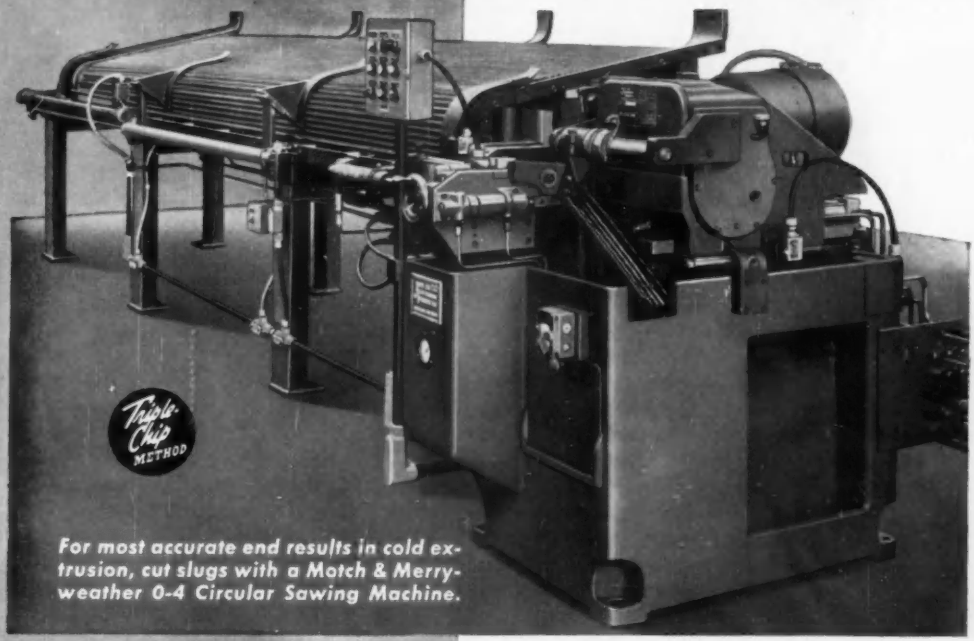
cold cuts

BY MOTCH & MERRYWEATHER



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The Motch & Merryweather No. 0-4 Precision Circular Sawing Machine is automatic from the storage table to the finished cut slug. It cuts slugs accurate to ±.002" with uniformly square ends and minimum burr. Give your cold extrusion press the opportunity of producing more work than ever before, with more accuracy than ever before, at a lower cost per piece than ever before.

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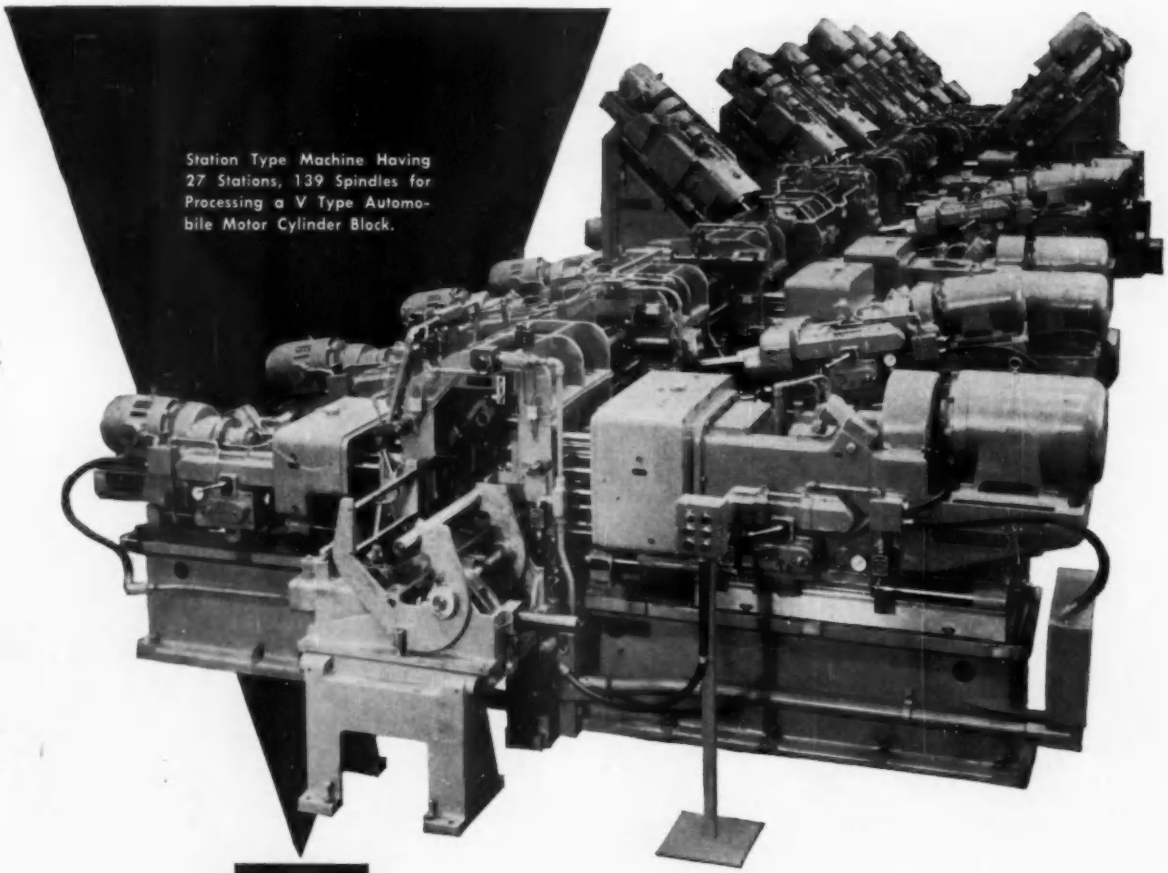

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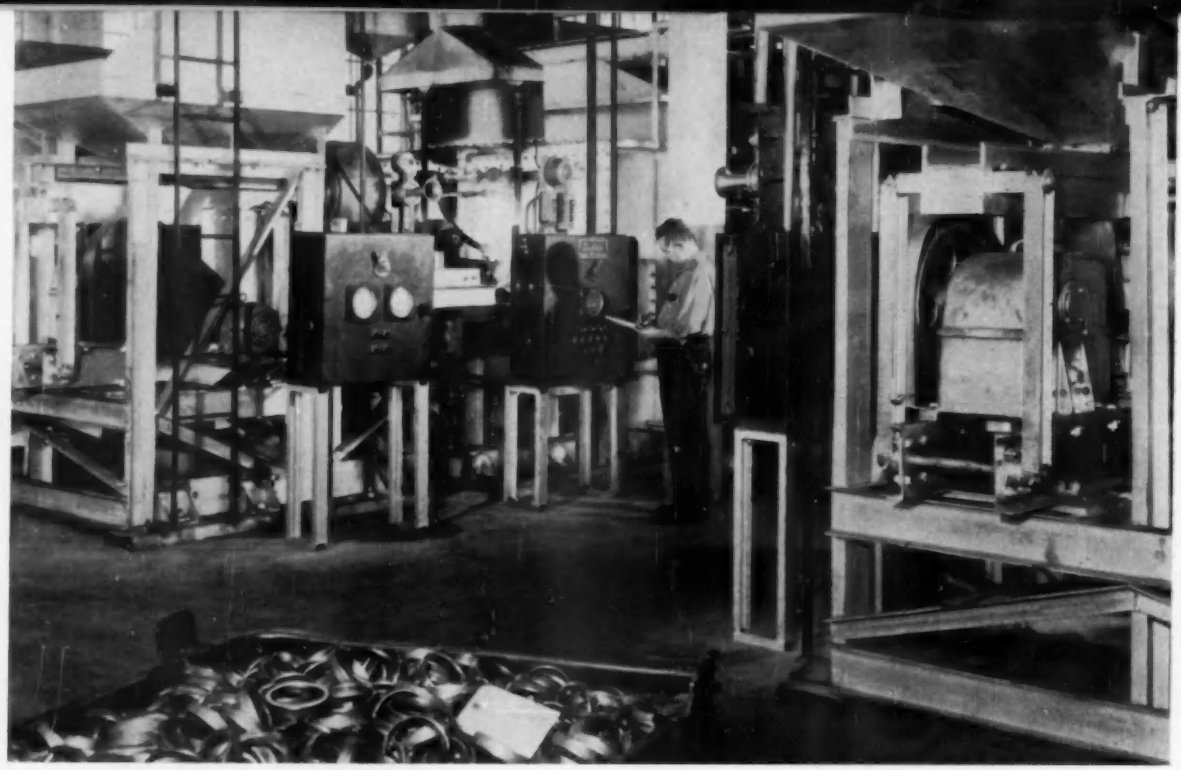


Cups are loaded into twin hopper bins to start the heat treating cycle. Time clocks synchronize all phases of operations including loading.

Automated Lines for Heat Treating Bearings

By

John Squire, Plant Manager
Bower Roller Bearing Division
FEDERAL-MOGUL
BOWER BEARINGS, INC.

WHAT amounts to practically pushbutton automation in the heat treating of roller bearing components is being accomplished at Bower Roller Bearing, Division of Federal-Mogul Bower Bearings, Inc., Detroit. The equipment consists of three batteries of continuous furnaces which operate automatically through carburizing, hardening and drawing. The three batteries of furnaces, located strategically in the various departments, are controlled from a centrally located metallurgical laboratory. This totally mechanized setup has resulted in cutting rejects approximately 50 percent, overall costs have been reduced considerably, and product quality has increased.

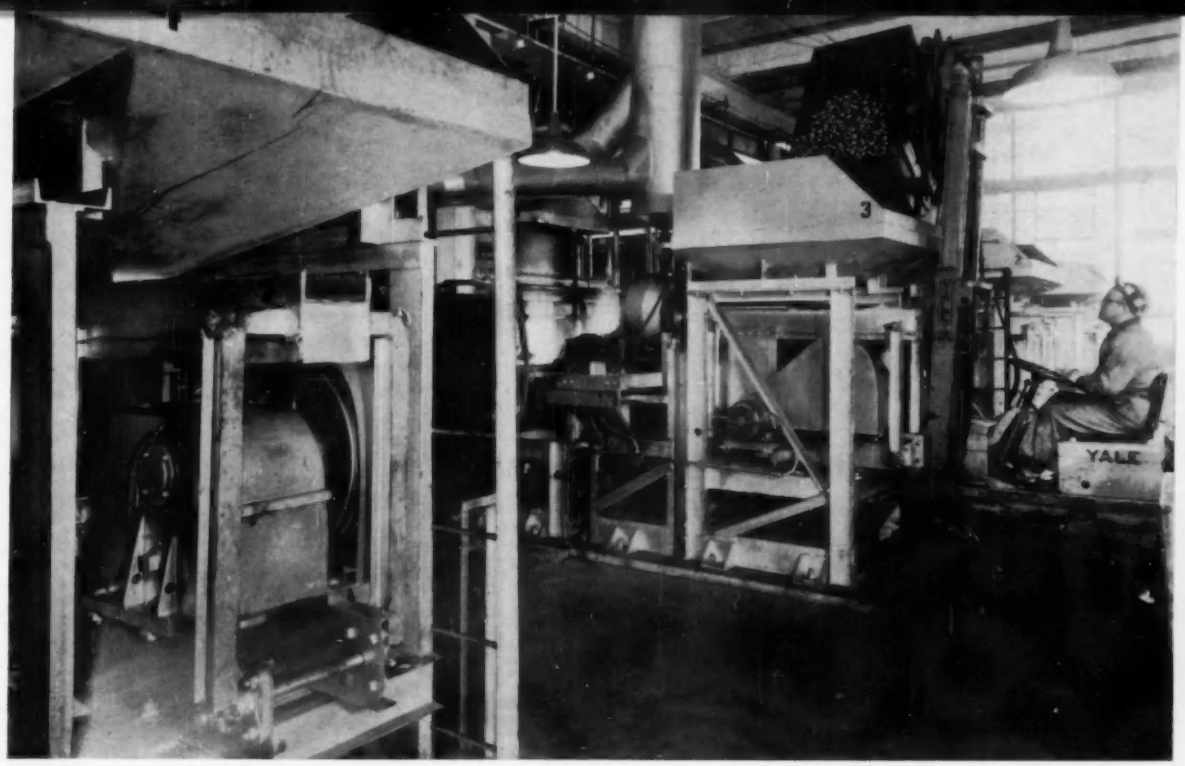
Three batteries consist of eight furnace lines which include 22 continuous furnaces built and installed by Surface Combustion Corp. These furnaces are located in three different departments manufacturing the three major components of a complete bearing assembly. These components consist of the cups or outside races, cones or inside races, and the rollers. All furnaces for carburizing and reheating are atmosphere controlled and heated by radiant tubes; the draw furnaces are of the recirculated air type.

The cup battery is made up of two identical lines each consisting of a carburizing furnace, a pusher type reheat furnace, a press quenching machine and a recirculating air draw furnace of the revolving retort drum type. Two quench tanks and two industrial washers are included in each line.

A battery of four lines is used for heat treating cones and cups that do not require press quenching. Each of these lines consists of a carburizing furnace, a reheat furnace, a recirculating air draw furnace, two quench tanks and two industrial washers.

The battery of furnaces used for heat treating rollers has two lines, each with a hardening furnace, a quench tank, an industrial washer and a recirculating air draw furnace.

Unique in the operation of these furnace lines is the method of metallurgical and physical control. There are no furnace operators as such. Bower uses a total of 12 men who are classified as furnace tech-



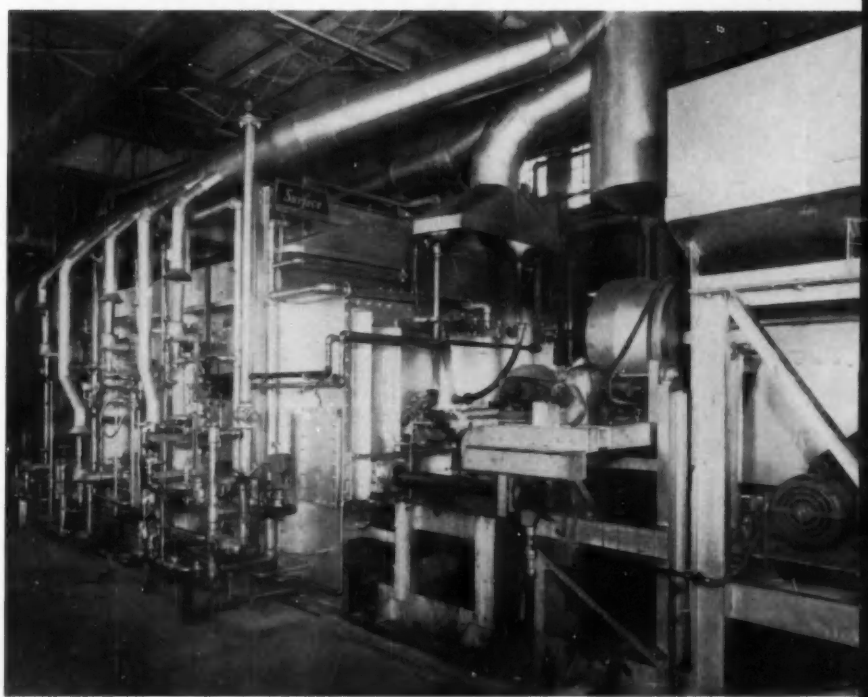
Lift truck loads skid of cones into a twin hopper bin at the four line battery of heat treating furnaces. Vibrators fill drum metering devices that weigh parts for uniform loading of parts into the furnaces.

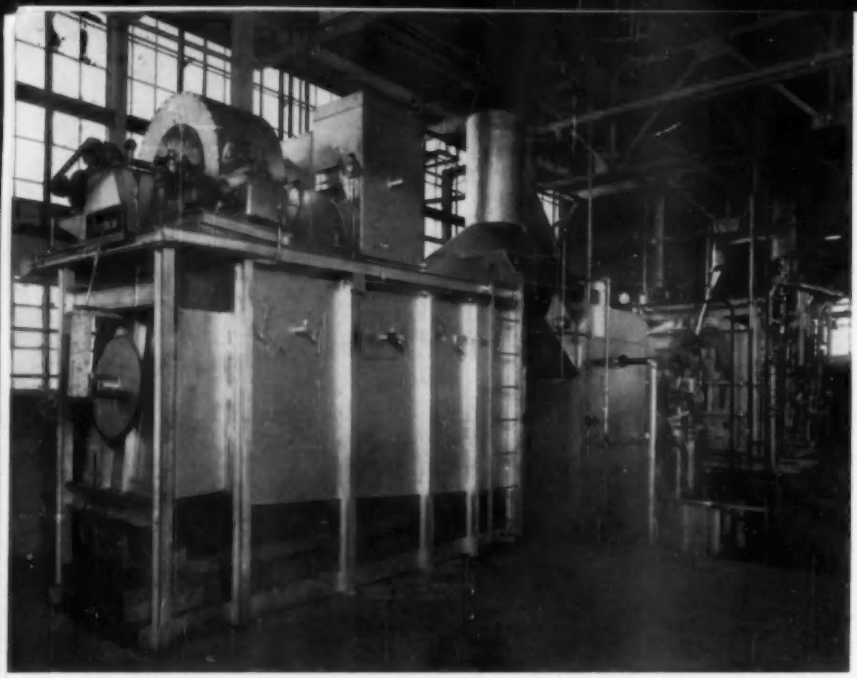
nicians on the furnace lines during three shifts. It is their duty to watch the furnaces, to see that all mechanical chemical devices are functioning properly and "bottlenecks" do not occur. Technicians do not load or unload furnaces or make repairs. Should mechanical troubles develop, maintenance men will correct them. Regular shop stock handlers load the furnace hoppers and remove the finished work all by lift truck.

All temperature control instruments are located in a complete metallurgical laboratory, centrally located. Laboratory assistants are used as liaison men between the furnaces and laboratory. It is the duty of these men to obtain samples at various points in the heat treating lines to be spot-checked by bench metallurgists in the laboratory. After results of the tests are obtained, the results are then made known to the furnace technicians and laboratory foreman who, in turn, make any necessary adjustments in the process.

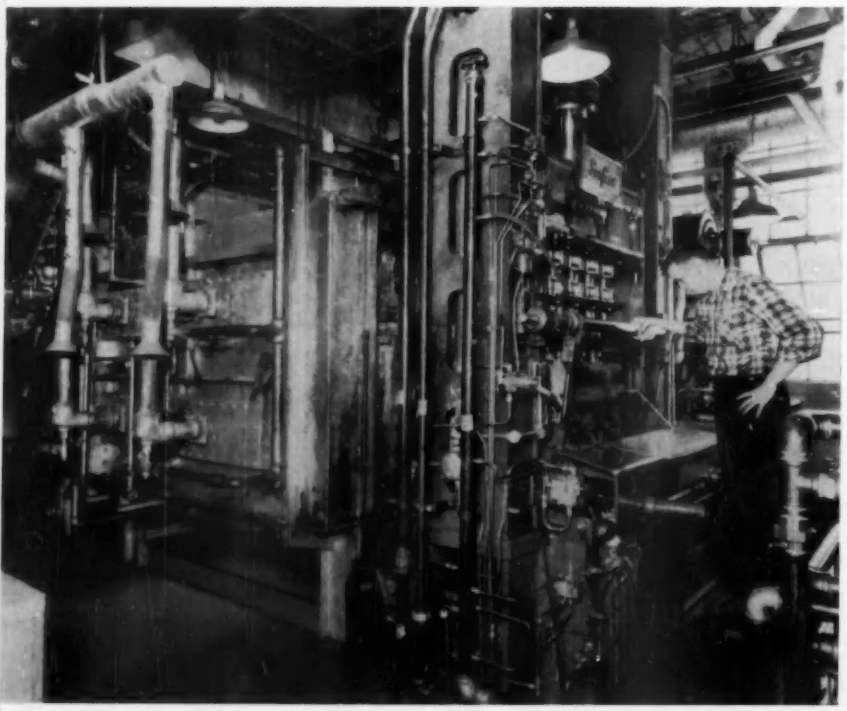
These tests are taken periodically at various points in the lines. The test parts are gathered continuously at various stations by specially designed catch baskets. This automatic sampling system makes possible the close quality control of heat treating at Bower. Once the

Metering drum dumps parts on vibrating conveyor that places parts in one of two revolving retorts in the carburizing furnace.





Discharge end of one of the roller heat treating lines. Due to extremely small sizes of some rollers, belt conveyors are used to prevent loss of parts being transferred from one operation to another. Deflecter at discharge end of draw furnace distributes parts to fill three shop pans thereby cutting removal time to one third.



Quench press automatically cycles through the quench operation and is synchronized with the rest of the heat treating operations.

line is in operation on a cycle, all that is necessary personnel-wise, is to watch trends of producing duplicate results in hardness, case depth, size change and carbon content.

This plant requires a variety of case depths in the different sizes and types of bearings. In order to provide the necessary production as well as proper carburizing time and still keep the furnace lines within a reasonable physical length, the carburizing furnaces were designed with two identical retorts in each of the heating chambers. The retorts have approximately 11 ft of effective heating length. However, in order that the work move slowly enough to have proper carburizing time, the retorts are made to revolve alternately clockwise and counter-clockwise. The forward progression of parts is accomplished by revolving the retort somewhat more in the forward than in the reverse direction.

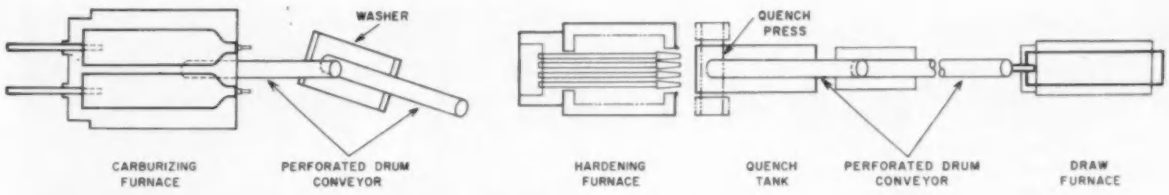
Two retorts are used to furnish enough carburizing capacity for the following reheating furnace. The product of both retorts is quenched through a common quench chute. Reheating furnaces are supplied with only one retort, since heating time is much less than carburizing time. The carburizing cycles used to accomplish the desired case depth are 8 to 11 hours at 1700 F.

Separate time clocks control the loading of the furnace and revolving of the retorts. All are coordinated to make the complete line one synchronized unit, regardless of the heating time in any of the various furnaces. No equalizing storage within the line is necessary because of the precise coordination of the various units.

Five Surface RX Gas Generators each of 3600 cfh capacity supply atmosphere to the cup and cone lines. This atmosphere is enriched with natural gas for carburizing. These generators are controlled by surface signalling dew point controllers.

Rollers

When the rollers arrive at the hardening and drawing lines, they are dumped into storage hopper bins which feed them into a weighing, metering drum. They are then metered into the furnace at a constant rate. Work passes through the revolving retort and is oil quenched. From the quench the parts travel on a belt conveyor through a spray wash where quench oil is removed. The parts drop off this belt into the Surface revolving



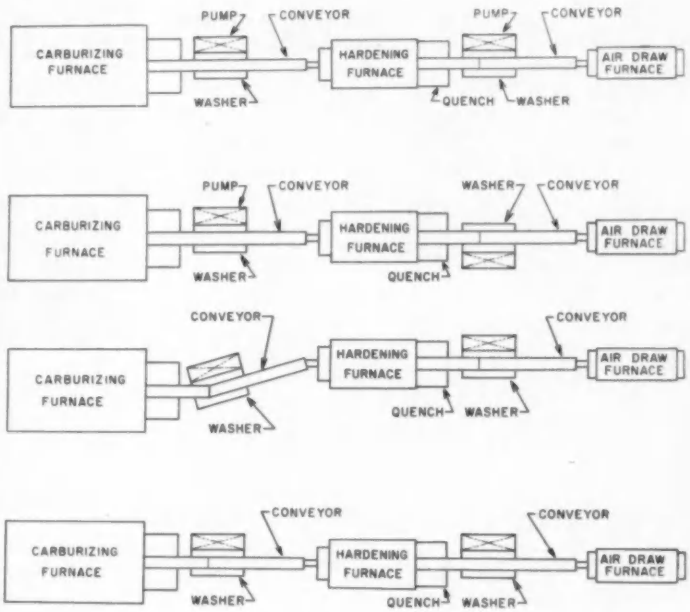
Schematic diagram of 'press quench' line showing one of two identical lines.

drum air recirculating draw furnace and are collected into palletized shop pans after drawing. Belt conveyors are used for moving rollers through quench and washers to prevent loss of small rollers.

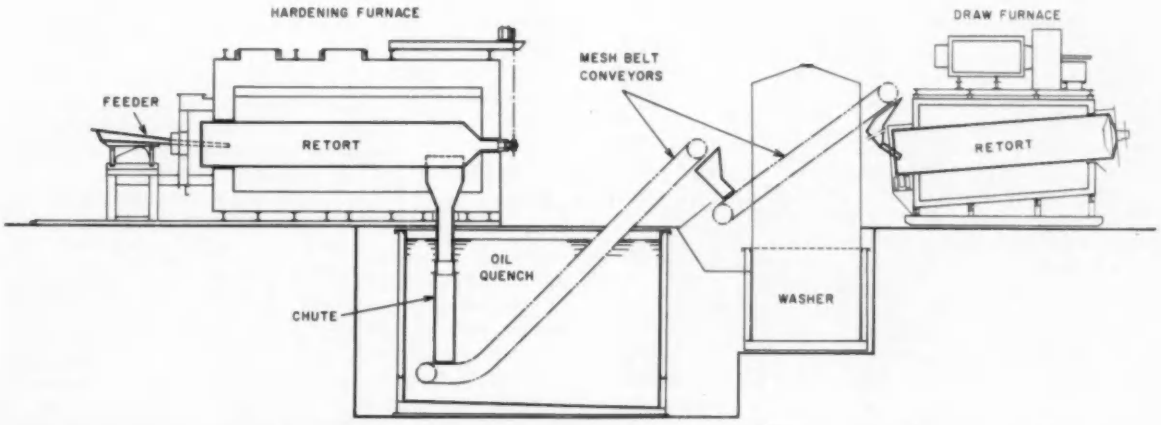
Outer Races

Outer races are taken to the heat treating lines and loaded into twin hopper storage bins. From the bins, parts drop into vibrating conveyors located one under each hopper. The vibrator flows the cups into revolving drum metering and weighing devices. At a given weight the metering device loads the parts into vibrating conveyors which loads them into each retort in the furnace where they are carburized at 1700 F and oil quenched.

A perforated drum rotary conveyor takes the parts from the quench tank into another perforated drum rotary conveyor which passes the work through a spray washer and dryer. After washing,



Layout of furnace lines in the cone heat treating battery at Bower is typical of other batteries at this plant.

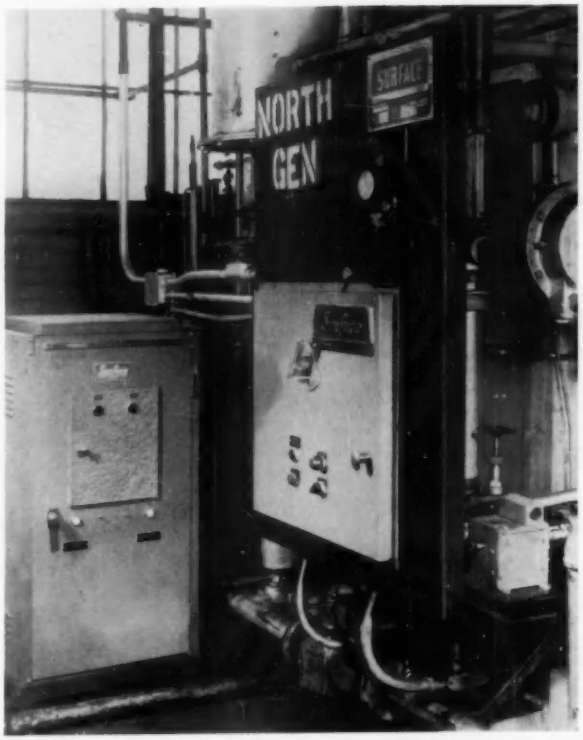


Schematic of Surface roller heat treating equipment at Bower Roller Bearing. Mesh belt conveyors are used on the roller lines because of the small size of some rollers.

the parts fall onto a belt conveyor, which transports them to a loading device. At the same time a chute loads the parts into four different rails in the pusher reheating furnace. The parts are then pushed forward through the reheating furnace four at a time, and as they drop out of the furnace they slide onto a chute which leads them to the platen and into the ring of the press where they are automatically quenched.

Quenched parts fall into a cooling oil tank where they are carried upward by an inclined rotary drum conveyor which delivers them to a rotary spray washer and dryer. At the exit Rockwell hardness is 65 to 66C.

A rotary recirculating air draw furnace in line completes the heat treatment, and the work drops into tote pans. Rockwell hardness is 60 to 63C.



Signalling dew point controller and panel board of one of eight Surface RX gas generators used at this operation.

Cones

From hoppers the cones are vibrated into a rotary drum metering and weighing machine, that delivers them through a vibrator charger to the retorts of the carburizing furnace which is operating at 1700 F. Parts pass through this furnace into a quench tank from which an inclined rotary drum conveyor delivers them to a rotary spray washing machine.

From the spray washer, parts advance through a revolving retort reheating furnace for hardening at 1500 F. They are quenched in oil to a hardness of 65 to 66 Rockwell C, then washed and dried, and passed through a rotary retort air recirculating Surface draw furnace for a final hardness of 60 to 63 Rockwell C. From this operation parts then go to final grinding, inspection and assembly.

Utilization of total automation techniques becomes ideal when the duplication of products is a major factor, as it is in the bearing industry. Production of roller bearings at Bower Roller Bearing Division is a classic example of automation carried to the most logical degree of practicality.

It is gratifying to note that when challenged by the bearing industry heat treating equipment builders were able to meet this challenge.

• • •

Chrysler Corp. Will Construct Assembly Plant Near St. Louis

Chrysler Corp. will build a 1.3 million sq ft plant near St. Louis, Mo., for passenger car assembly and possibly body production. The new plant, said to be a $50 million project, will replace Plymouth body and assembly operations at Evansville, Ind.

Group vice-president William C. Newberg said the new location will enable Chrysler to serve southwestern and south-central dealers more economically, with particular savings in transportation. The one-story plant will employ "upwards of 3500 persons," he said, and have a two-shift capacity of 960 cars a day. The plant will be built on a 200-acre site, 20 miles southwest of St. Louis on Highway 66.

Current plans call for closing the Evansville plant after the 1959 model run, with the new Missouri plant starting up with 1960 Plymouth production. The new plant eventually may be a corporation assembly plant, rather than just Plymouth.

Auto-Lite to Supply Chrysler With Electrical Components

Electric Auto-Lite Co. has signed an agreement with Chrysler Corp. under which the Toledo firm will supply "substantially all" of Chrysler's starting motors, generators, distributors and voltage regulators for the next three years. Chrysler earlier had announced it was working on a program for the design and manufacture of some of its own electrical components, working in cooperation with Auto-Lite.

General Tire Sales, Earnings Up During Nine-Month Period

General Tire & Rubber Co. reported sales and net earnings for the period ended Aug. 31 were up from last year, with sales for the three-month period hitting $105,122,880 and earnings totaling $2,730,731.

For the comparable quarter of 1956 sales were $100,395,569 and earnings were $2,031,594. For the nine-months ended August 31 earnings were $8,545,592 ($1.61 a share) on sales of $311,091,049 compared with net earnings of $6,059,025 ($1.17) and sales of $278,192,007 during the like period a year ago.

Mechanical Handling Expedites Forging of Axle Shafts

By Herbert Chase

PRODUCTION of axle shafts is among the long run jobs done in the forge plant operated by Oldsmobile Division of General Motors Corp. in one of its Lansing, Mich. units. This shop has three nearly identical setups for fast axle forging and two more are in process of installation.

After heating about half the length of the round SAE 1038 bar stock used for the shafts, this portion is put through Ajax forging rolls that produce the end to be splined and the adjacent taper in a fairly conventional setup. During roll forging, the operator holds the cold end of the bar with tongs. Immediately thereafter, the rolled end is inserted in a hammer die that swages it to insure round and true surfaces.

When the forging has cooled to room temperature, it is placed on a chain conveyor, Fig. 1, that causes the large overhanging end to be advanced through the slot of a high speed Surface Combustion furnace. At the end of this conveyor, the shaft drops into a rocking arm device that is back of the screen in Fig. 2. This arm discharges the shaft beside the top of a four-cavity die in a 6-in. Ajax header (also shown in Fig. 2), with the hot end away from the operator of the header.

Cable-supported tongs are used by the operator to pick up each shaft by its cold end, head it in the top die cavity and pass the forging subsequently through the three remaining cavities. These operations produce the flange required and form in its outer face a cross shaped central recess by which the shaft is driven in subsequent machining. The machining is not done in this plant.

Forging is now completed, and the workpiece is dropped through the machine onto a conveyor from which it is removed later by the same operator who loads the conveyor shown in Fig. 1.

There is an increase in productive efficiency with this setup, some of which results from the mechanical handling, including the rapid automatic transfer from the chain on which the second heating is done to a good pickup point for the operator of the header.

Axle forgings are produced with equipment similar to that described not only for Oldsmobiles but also for Pontiac and Cadillac cars. All these forgings are similar in design but differ slightly in some dimensions.

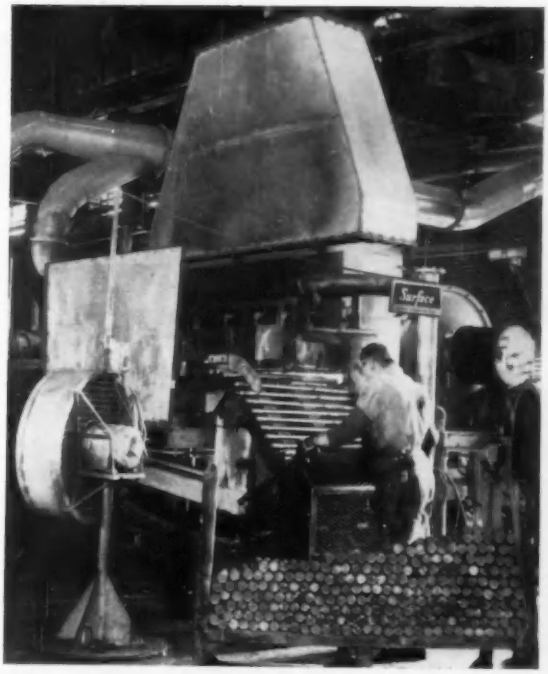


Fig. 1—After axle forgings have had one end rolled and swaged, they are loaded in this conveyor. It advances the large ends through the slot of a high speed Surface Combustion furnace, background.

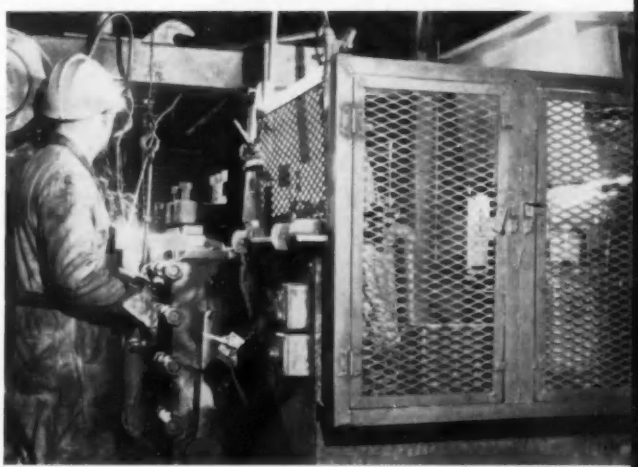


Fig. 2—When at forging temperature, the shafts are transferred by a swinging arm back of the screen to the Ajax header, left, and are headed in successive positions of the four-cavity die while held by cable-supported tongs moved by the operator.

AIR SPRINGS . . . *their effect on* Passenger Car Chassis Design

By
* A. S. Krotz
* R. A. Harrington
* J. L. Strong
* E. B. Katzenmeyer

AIR suspension springs fall into three general groups, the first and largest being full air springs where the vehicle is supported on some form of bag or diaphragm and air is valved into or out of the spring to maintain vehicle level. A second general class is the air spring used as a helper spring only, where the load is supported partially by a metallic spring, usually of the leaf type, and the air spring acts in parallel with the steel spring. The third class is the air-oil spring where a fixed weight of air or gas is sealed into a chamber of elastic volume, and wheel motion displaces oil which in turn compresses the gas.

All of these springs can be defined as providing an elastic support, of variable but known rate, plus a relatively small amount of energy absorption or hysteresis effects. It is obvious that the ride or characteristics of the vehicle in accommodating any dynamic ride situation will be no different with air springs than with any other spring medium of similar characteristics. The important advantages of air or air-oil springs are that they provide an easy means of maintaining the static designed level of the vehicle and, therefore, make it possible to accomplish other advantages, and also that the air spring does not change natural frequency rapidly with load change.

As to the response of air or air-oil springs to a range of frequencies, the type of spring and nature and area of surface exposed to the gas have some influence, but it is safe to assume that natural frequencies down to approximately 30 cpm will be at the dynamic or adiabatic rate. As frequencies drop below 30 cpm the elastic rate is reduced and at roughly 5 cpm, present laboratory data indicate that the spring for most installa-

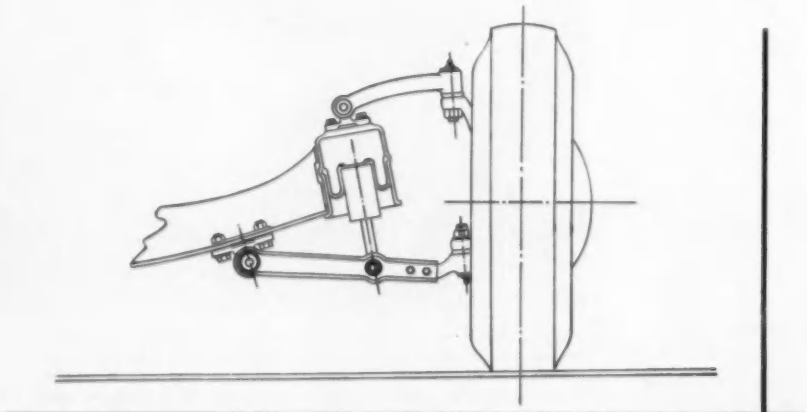


FIG. 1

Uncontoured air spring

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* R. A. Harrington, Senior Physicist, The B. F. Goodrich Co., Research Center, Brecksville, Ohio
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*E. B. Katzenmeyer, Staff Engineer, New Products Development, B. F. Goodrich, Akron, Ohio

tions approximates the isothermal or static characteristic. The difference between the adiabatic and isothermal rate is discussed later and may be less than 1.4 to one or may be as much as 8 or 10 to one or even higher. Frequencies higher than the natural frequency of the vehicle on the springs are being studied but data accumulated to date indicate that there is no significant change up to wheel hop frequencies. Above wheel hop frequencies, there is no evidence of a change in the spring characteristic so that distortions of associated parts and characteristics of hinge points and attachments become the determining factors as discussed later.

The fundamental characteristics of a gas spring are expressed in the gas law $\frac{P_1}{P_2} = \left(\frac{V_2}{V_1}\right)^{\gamma}$ where P is the absolute pressure in the system. The exponent gamma is 1.4 for air and if the spring is of simple uncontoured construction as in Fig. 1 it will give a load-deflection curve as in Fig. 2. The rate increase with increased load, shown in Fig. 3, is slightly less than sufficient to maintain a constant frequency as the weight increases. Such an air spring will have an adiabatic or dynamic rate 1.4 times its isothermal rate. As the static load increases, the simple gas spring will stiffen its adiabatic rate as shown in Fig. 3, the adiabatic rate remaining 1.4 times as stiff as the isothermal rate.

For a simple, uncontoured air spring the system volume required at a given static pressure P_o to give a required spring rate K_u will be $\frac{1.4\left(1+\frac{a}{P_o}\right)L_o^2}{P_o \times K_u}$ or for example if a spring load of 1000 lb is to be supported on a simple air spring at 200 psi gauge pressure (214.7 psi absolute) and an adiabatic spring rate of 50 lb per inch is required at the spring, the system volume must be 150.5 cu in. The isothermal rate will then be 50/1.4 = 36 lb per in. If the load is increased to 1500 lb, the adiabatic rate will increase to 73.2 lb per in.

The air spring may be contoured in two separate ways, first through the ride range and second to obtain greater build up in jounce and greater load drop in rebound. References to spring contouring apply to the ride range and not to rebound or jounce. It is convenient to measure contouring through the ride range in terms of per cent change in effective plunger area per inch of plunger stroke. Where

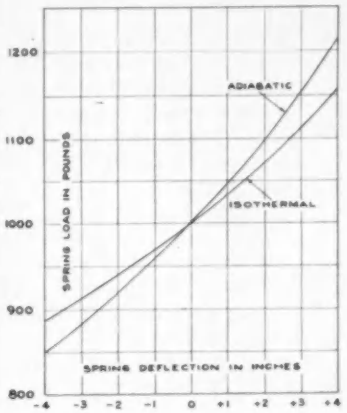

FIG. 2

Spring load curve for spring in Fig. 1

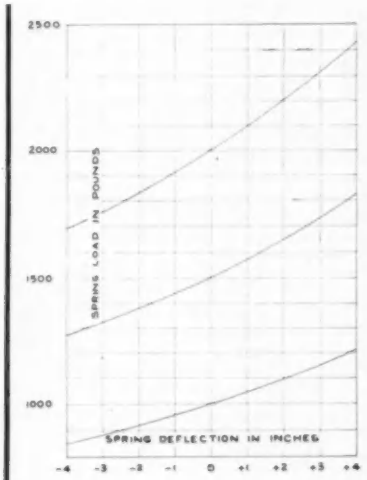

FIG. 3

Effect of changing static load on spring in Fig. 1

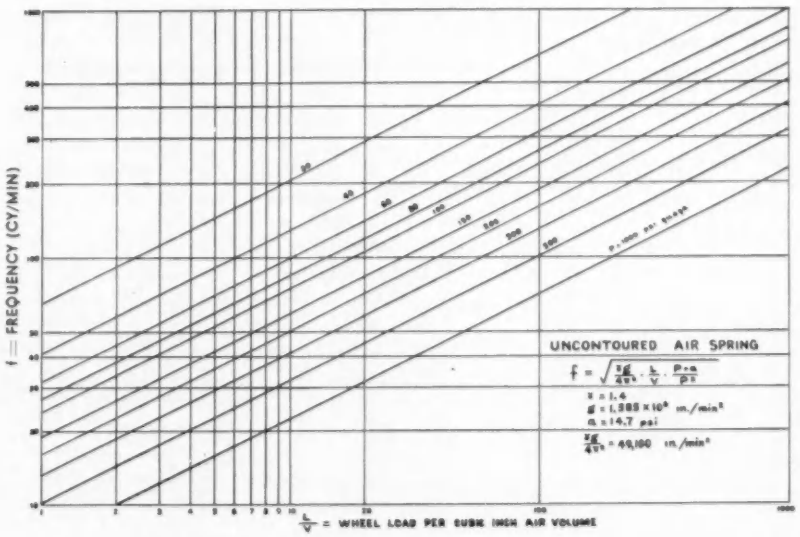

FIG. 4

At left—Relation of system pressure and natural frequency at the wheel.

insufficient room is available for system volume, negative contouring, that is, a reduction in effective plunger area as the wheel lifts, will permit reduced system volume without changing the adiabatic rate, but at a penalty of increased ratio of $\frac{K_a}{K_i}$ or adiabatic to isothermal rate. This relation can be expressed as follows for any predetermined adiabatic to isothermal ratio, where $\gamma = 1.4$, a = 14.7 psi, P = static system pressure and L_o = static spring load.

$$\text{System Volume} = \frac{\text{ratio}}{\text{ratio} - 1} \times \frac{(\gamma - 1)\left(1 + \frac{a}{P}\right)L_o^2}{P \times K_a}$$

This can be simplified to give the relation that system volume must increase to decrease this ratio. In the above example, if the designer can find room for only 82 cu in. system volume, he must accept a ratio of 2.10 which tells him the extent of negative contouring required.

A convenient factor in spring design is the pounds load supported at the wheel per cu in. of system vol. or L_o/V. System pressure and natural frequency at the wheel are then related as shown in Fig. 4.

In arriving at required static system pressure the bag and plunger design and some chassis considerations are of importance. Relatively high pressures can be maintained, particularly with a closed system where air exhausted from the springs is retained in the system and not necessarily at ambient pressures. As the system pressure goes up, the required effective plunger area is reduced. However, the gap filled by the bag loop cannot be reduced proportionately. Figure 5 illustrates a typical air spring designed for 200 psi, 1.56 ratio and 1000 lb wheel load to give 40 cpm frequency. The corresponding adiabatic wheel load curve is given in Fig. 6.

There are two major factors in deciding the gap on such a spring. First is misalignment and second is the change in circumference as the bag loop rolls up and down on the plunger. Misalignment can be divided into, first, the inaccuracies appearing at assembly of the car, and, second, the movement of the related parts on the road. In the spring illustrated in Fig. 5 misalignment is negligible. Therefore, gap was chosen as a compromise between two conflicting factors. First the bag cannot be bent or flexed in too tight a loop, and, second, the problem of how much the diameter of a section of the bag changes during the wheel stroke. In this case the cords in the bag lie at an outer diameter of 3.08 in. and an inner diameter of 1.96 in. at the static position. This represents a definite change in circumference of a spot on the bag. For example, in rolling from static position up to a plunger position one inch toward jounce, the circumference of the section of the bag changes from 9.67 to 6.15 in. or a 36 per cent reduction. The reverse is true in going from static to rebound. All current bag designs involve cord reinforcement similar to tire construction. Such cords do not stretch appreciably and, therefore, changes in circumference during wheel stroke cause change in cord angle and some change in effective bag length. Very satisfactory bag life can be obtained in

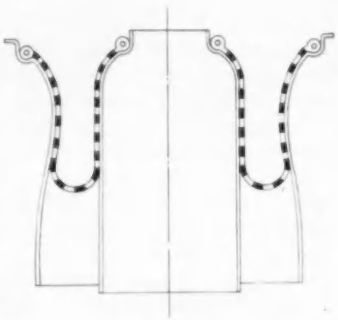

FIG. 5

Typical contoured air spring

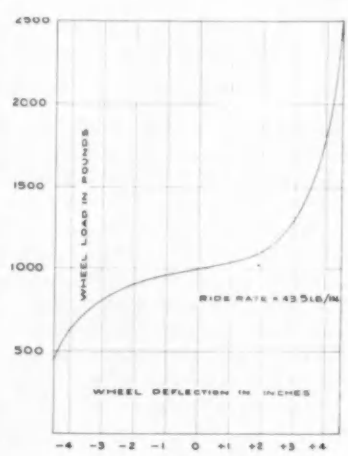

FIG. 6

Wheel load curve for spring in Fig. 5

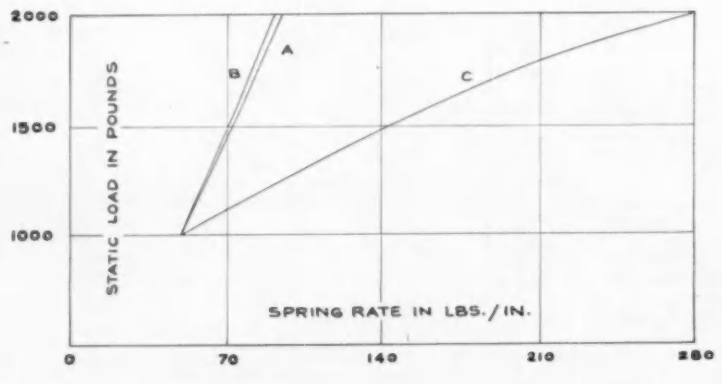

FIG. 7

Effect of changing static load at designed height on three types of springs

FIG. 8

Group of air springs made by B. F. Goodrich Co.

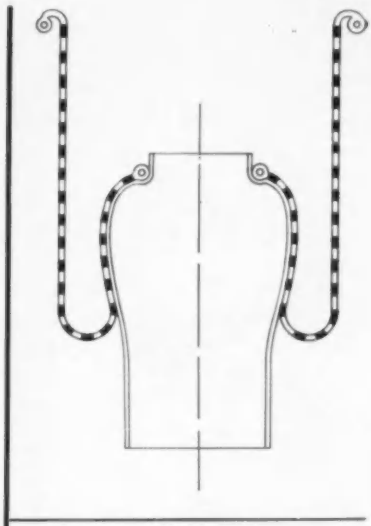

FIG. 9

Uncontained type of air spring

spite of this working, but it does impose some objections to very wide gap.

With the maintaining of a constant designed height of the vehicle the designer is given added freedom. Propeller shafts can be laid out for relatively fixed universal joint angles and tunnels can be lowered. Independent rear suspension may have added attraction. The "swing axle" type can be used without change in static camber. Also transmissions would probably move to the rear. However, the one biggest advantage is probably that the spring rates can be reduced below anything practical in the past.

Nominal deflections of over 30 in. are now possible, with natural frequencies down to 30 cpm or even lower. The limiting factor now is the attitude of the car to the road and not the height at which the whole car stands. The attitude of the car to the road, or its departure from a horizontal plane, depends directly on the elastic properties of the suspension, but with air springs it is the isothermal rate which must be used in calculating the spring reaction to the relatively sustained forces caused by cornering, braking and power, and the ratio $\frac{K_a}{K_i}$ becomes important. Brake dive at the front can be controlled by geometric means well known for at least 25 years. Power lift at the front cannot be controlled on a rear drive car by any geometric method known to the authors although valving is

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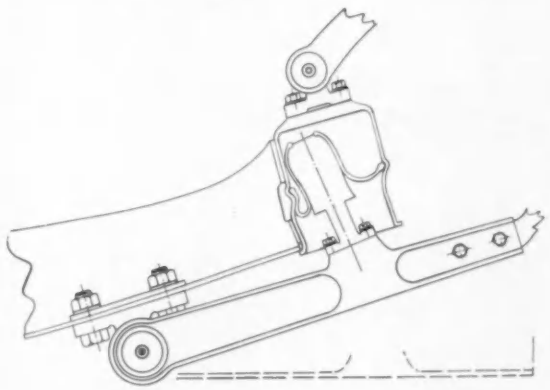


FIG. 10

Fixed element spring in jounce position

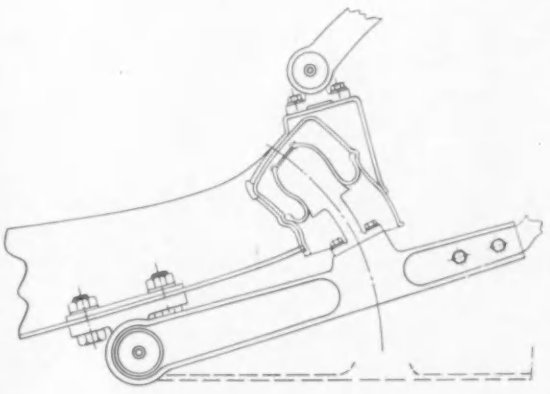


FIG. 11

Torus type spring in jounce position

New Italian Models, Special Body Styling Highlight Turin Show

By Robert Braunschweig

New Fiat 1200 four door sedan

Alfa Romeo 2000 four door sedan which features a five-speed transmission

TURIN, ITALY

ITALIAN cars displayed at the 39th Salone Internationale dell' Automobile, held last month at Turin, consisted of several newly designed vehicles and a large number of interesting special body styles.

Among the production cars, Fiat introduced a new 1200 four door sedan and a two passenger convertible. These are developments of the earlier Fiat 1100 TV. With a bore enlarged from 2.68 in. to 2.83 in. the four cylinder engine now has a piston displacement of 67 cu in. Maximum torque is 61 lb ft at 2700 rpm. The small 500 Fiat has had its power output increased from 13 to 15 bhp.

Two new models were shown by Alfa Romeo, the 2000 which will replace the 1900 range and an improved version of the Giulietta. The 2000 will be produced both as a four door, six passenger sedan and a two/four passenger convertible designed especially for the U. S. market. The sedan is based on chassis components of the 1900, but output of the 120 cu in. engine has been increased to 105 bhp at 5300 rpm. A five-speed conventional transmission with Porsche synchronizing units is used with this engine. The ultra-streamlined Giulietta Sprint Speciale coupe with body by Bertone is similar in

The "Florida II" two door hardtop by Pinin Farina on a Lancia Flaminia chassis

mechanical features to the other models but is powered by an 80 cu in. engine which is said to develop 100 bhp.

Although no new Lancia models were shown, a Florida II hard top body by Pinin Farina was displayed on a Lancia Flaminia V6 chassis. Another Pinin Farina body, the Sestriere coupe, was shown on an experimental version of the new Alfa Romeo 2000. It featured a sliding door arrangement on the driver's side of the body.

Ghia showed three Chrysler cars with special bodies, two of which used the 300 C chassis. The long Imperial Crown chassis was used for an even longer eight passenger sedan. With an overall length of 21 ft this is said to be the longest production model built at present. A sliding-top station wagon and a small passenger car on the Fiat 500, also by Ghia, were displayed.

A new 410 Super America coupe on a standard Ferrari chassis was shown by Pinin Farina.

Among the interesting exhibits were the Fiat 500 special bodies. The Frua two passenger car has its headlamps located back under the windshield. The Abarth Farina 500 features a Porsche-like front design, and the Zagato coupe represents a sports model.

Ghia de luxe body on Chrysler 300 C chassis

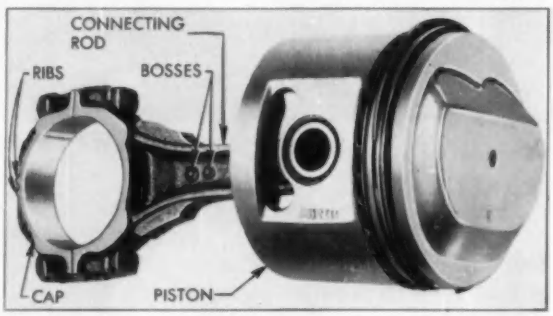
Alfa Romeo Giulietta Sprint Speciale has an 80 cu in. engine which develops 100 hp at 6000 rpm

New Combustion Chamber Designs in 1958 Passenger Car Engines

By Joseph Geschelin

OF great significance this year is the emergence of what may be termed unconventional combustion chamber configurations in a number of 1958 V-8 passenger car engines. Since these are new engines in every sense and of larger displacement than the rest of the family, it may be assumed that at the proper time other engines may undergo the same kind of transformation. Moreover, the attack on combustion chamber design may well augur even more important improvements in the near future.

BUICK



Buick piston and connecting rod assembly. Note the molded impressions for valve clearance on one side.

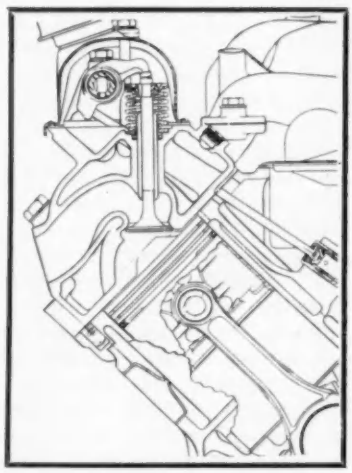
WE refer particularly to the several examples to be mentioned later where the combustion chamber has been removed from the cylinder head, and the employment of stepped piston domes to provide the necessary configuration when the piston is at top dead center. Up to this year the use of a domed piston head in passenger car engines has been the exclusive province of Buick.

One of the major gains accruing from this design is a fully machined combustion chamber, implying the natural advantages of consistently uniform volume as well as the elimination of rough areas and projections which usually serve as foci for the accumulation of carbon as well as the initiation of local hot spots. Although the combustion chambers in the new Ford engines remain conventional, they have been redesigned to permit of machining and thus enjoy some of the same advantages.

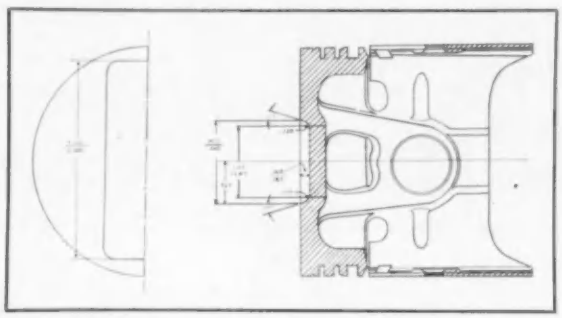
The major change in Chrysler Corp. engines has been an emphasis upon single rocker shafts for each bank, as contrasted with the earlier practice of using double rocker arms. In fact, for 1958 the only engine still retaining double rocker arms is the one for the New Yorker and Imperial. By the same token the rest of the engines in the line no longer feature the machined hemispherical combustion chamber.

BUICK—This engine is unchanged in basic design, the combustion chamber being shown in Fig. 1. It will be recalled that the valves are positioned vertically rather than in an inclined position. Fig. 2 shows the development of the domed piston head as well as the recess to provide for clearance for the valves.

BUICK



Buick combustion chamber showing stepped piston dome which has been used for some time.

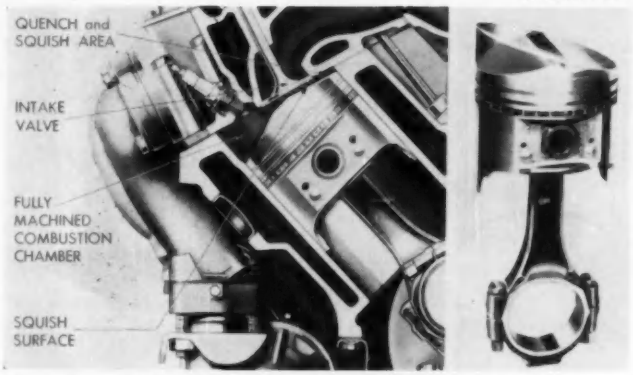


CADILLAC

Drawing of Cadillac piston showing detail of the large groove milled in the top of the piston head for valve clearance.

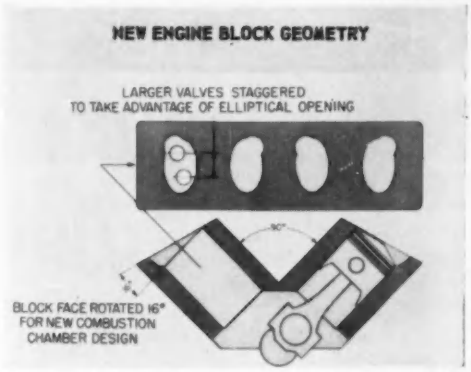
CADILLAC—The displacement of the 1958 Cadillac engine remains unchanged but compression ratio has been upped to 10.5 to 1. The combustion chamber is conventional. But there is a new cylinder head

CHEVROLET



New Chevrolet combustion chamber in which the chamber configuration is formed when the piston is at top dead center. The view at the right shows the formation of the piston dome.

CHEVROLET



Geometry of new Chevrolet arrangement. Note elliptical development of the bore opening the bank face, providing additional space for valves.

with valve centers wider spread to permit the use of a larger exhaust valve. Fig. 3 is a drawing of the new piston to show something different this year—the machined groove in the head, providing clearance space for the valves.

It is of interest to note that the Cadillac combustion chamber not only is completely machined but is machined in several stages to assure perfection of contour and fine surface finish.

EDSEL

Combustion chamber in new Edsel engine employs a small step rather than a dome in the piston.

CHEVROLET—Here is an example of the new principle in combustion chamber configuration for the new 348-cu in. V-8, Fig. 4. The face of the cylinder head is machined plane while the bank faces of the cylinder block are machined at an angle of 16 deg to the normal axis of the bore. The piston dome is in the form of a Vee with a flat at the center as shown in the view at the right. With this general arrangement, the combustion chamber is formed when the piston is at top dead center. As illustrated, one section of the piston dome provides for the quench and squish areas while the flat and the opposite section develops the wedge chamber.

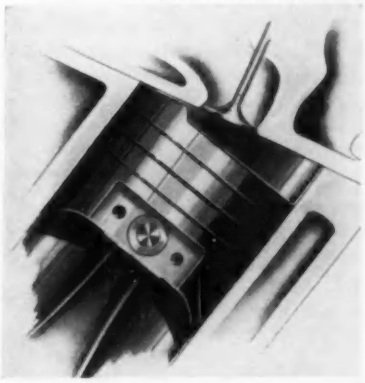
A schematic sketch of engine block geometry is seen in Fig. 5. Note particularly the elliptical form of the opening of the bore on the inclined bank surface. This provides more room for larger valves and a staggered arrangement of valves.

EDSEL—The geometry of the 410 cu in. Edsel engine is illustrated in Fig. 6. In this instance the piston head is flat except for the step which provides for the quench and squish area. In the case of this engine the cylinder head face is machined flat while the bank faces of the cylinder block are machined at an angle of 10 deg to the axis of the bore. This chamber permits a favorable placement of the spark plug.

FORD—This member of the Ford family of engines retains the conventional combustion chamber geometry. Its distinctive feature, and the reason it is mentioned here, is that the combustion chambers in the cylinder head are fully machined as shown in Fig. 7. Ford uses an 18-mm spark plug with a projecting insulator that places the electrodes farther into the combustion chamber, resulting in shorter flame travel.

MERCURY and LINCOLN — Both lines in this division use the basic 430 cu in. engine, new for 1958. Here the cylinder head face is machined flat while the top face of the cylinder block banks are machined at an angle of 10 deg with respect to the axis of the bore. As in the case of the Edsel, the piston head is flat with a step at one end as shown in Fig. 8.

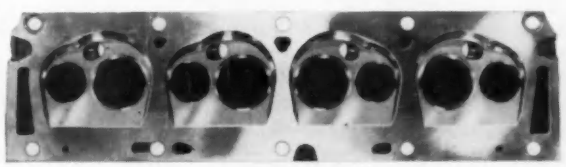
MERCURY AND LINCOLN



Combustion chamber typical of the 430-cu in. V-8 available in the Mercury and Lincoln lines.

FORD

View of one of the Ford cylinder heads showing the machined combustion chambers.



BRIGHT OUTLOOK *for* STAINLESS STEEL

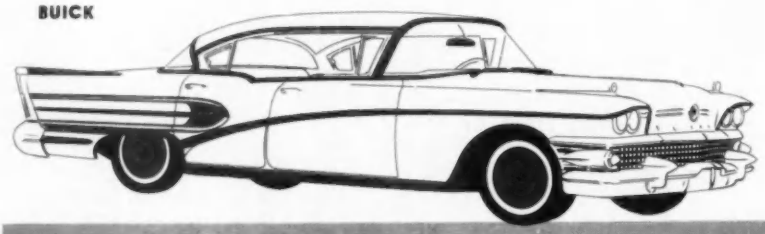
PROSPECTS for the use of stainless steel during the current model year are just as bright as the brightest new model on the road. In the face of a slight decline in total shipments, stainless steel shipments to the automobile industry, have held firm and are even ahead of last year. Shipments for the first nine months this year totalled 76,757 tons as compared to 70,044 tons for the same period last year. The fourth quarter, traditionally the heavy buying period for stainless by the automobile industry, is expected to keep total shipments well above last year.

An examination of the exterior styling of 1958 models discloses the reason for increased shipments. Body brightwork is the area where stainless steel is king and most models this year carry more brightwork to take advantage of its sales appeal. Dealers are plugging the advantages of stainless steel trim and are finding a responsive audience according to a nationwide survey made by the Committee of Stainless Steel Producers, American Iron and Steel Institute. It indicated that the majority of car owners prefer stainless steel for trim.

The exterior applications for which stainless is virtually standard in '58 include wheel covers, body side moldings, windshield moldings, roof and rear window moldings and rocker panel moldings. In addition, it is being used for window reveals, door handles, ornaments, grille bars and lamp housings. Stainless steel beading and molding are used extensively on interiors along with instrument panels, and miscellaneous hardware. These uses account for approximately 85 per cent of all stainless steel used by the automobile industry.

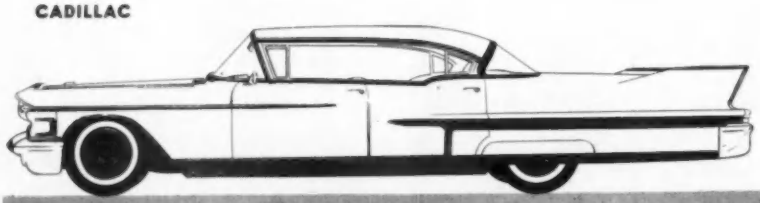
Strictly mechanical uses for stainless this year include exhaust valves, lock assemblies, critical carburetor and fuel pump parts, and numerous other small parts which require the combination of strength, corrosion resistance and/or heat resistance which stainless steel offers. In the past year a number of new uses for stainless steel in mechani-

BUICK



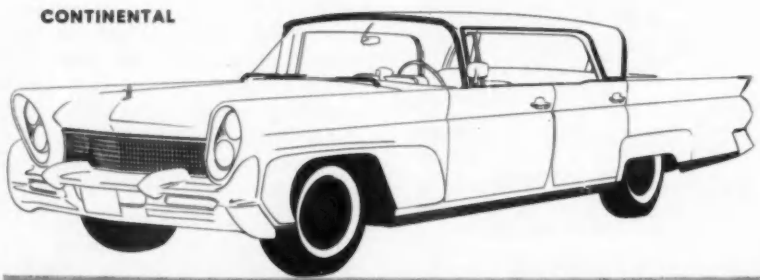
The use of stainless on the 1958 Buick has increased with the new stamping and moldings on the rear quarter panel.

CADILLAC



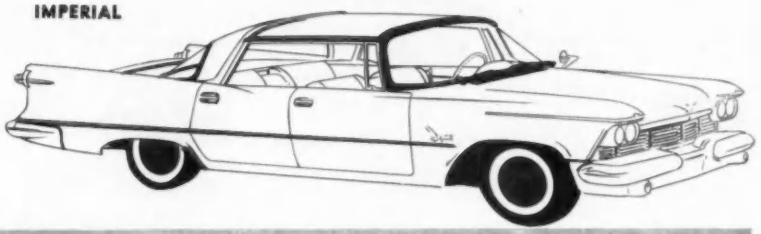
The Sixty Special Cadillac sedan features an integrated rocker panel-stone shield molding in stainless. A decorative insert is used between it and the upper rear quarter panel molding to offset the brightness of the stainless parts.

CONTINENTAL



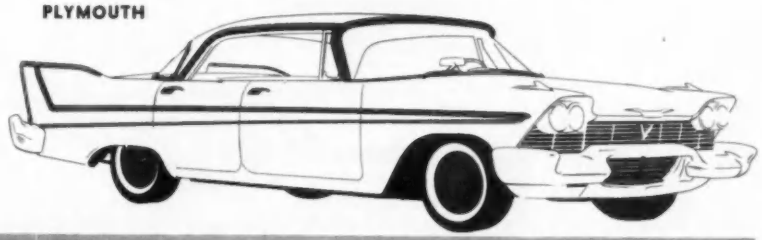
The Mark III Continental follows the Mark II tradition with the use of stainless for body and window moldings. The bright metal is also used extensively on the interior. Other Lincoln models carry a stainless steel side molding projecting toward the front end.

IMPERIAL



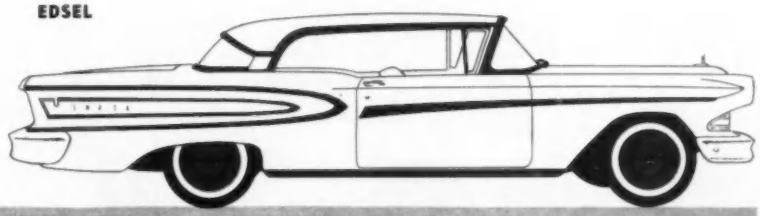
The new Imperial remains approximately the same in its use of stainless for body and window moldings and wheel covers.

PLYMOUTH



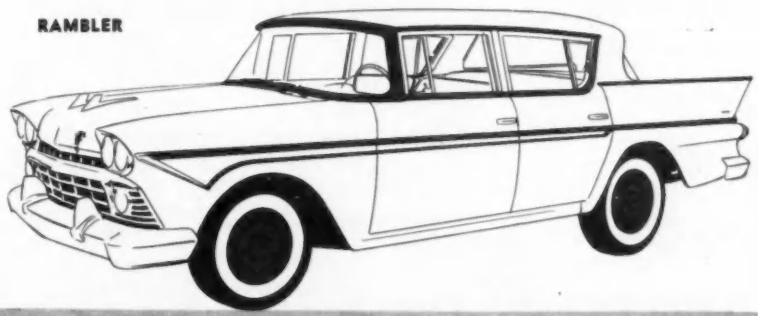
The '58 Plymouth features a new lower grille in stainless and revamped side molding treatment.

EDSEL



Stainless steel is used for key styling features of the new Edsel—the distinctive side treatment—as well as wheel covers and window moldings.

RAMBLER



The new Rambler fins are capped with stainless; the bright metal is also used for side moldings, wheel covers, as well as roof and glass moldings.

cal components have emerged. Among them are stainless steel top and bottom radiator tanks, transmission oil coolers and oil ring assemblies. Stainless got its first major play for body panels with the production of the stainless steel roof for Cadillac's Eldorado Brougham. Experience has shown that stainless steel panels of this type can be welded to carbon steel body stampings on a production line basis—a major factor in the possible future use of stainless for bright body panels.

The stainless steel muffler, a project which has been the subject of much discussion, may lie somewhere in the not too distant future with major work underway to simplify the design of current exhaust systems and thus reduce the number and weight of parts required. Conceivably, this would offset the added cost of stainless and provide an exhaust system serviceable for the full life of a car. One producer is having the complete exhaust system on a luxury car duplicated in stainless steel for test purposes. To date, the most successful application is the afterburner-muffler for trucks and buses made by a west coast firm. It is said to be 97 per cent efficient in removing hydrocarbons from exhaust gases.

Economical Fabrication

The workability of stainless steel is a key factor in its broad use by the industry. Economy in a finished part is, of course, of extreme importance even though the strength and durability of stainless are major reasons for its use. In general, there is a trend toward lighter gages by the industry to yield more parts per pound of stainless. In many cases, the strength of stainless is sufficient to permit its use in gages considerably lighter than would be considered in any other material. Beyond this point, manufacturers are making increased use of multiple roll forming—a technique in which stainless and a less expensive material, such as galvanized, are roll formed together. The method is not new but is being used more frequently. It holds possibilities for the use of stainless on parts which would otherwise require substantial weights of the material; bumpers, for example. Along these lines, clad stainless bumpers have been under test as a method of obtaining the scratch and corrosion resistance of stainless as well as its finishing qualities.

Stainless finishing on '58's varies from the use of mill polished (No. 2) strip without further finishing up to the application of a chrome

flash over buffed stainless to achieve a color match with plated parts. When the latter technique is used, neither copper or nickel is required for plating since the stainless needs no protection. Most popular finish on all '58 models is one obtained by final polishing and buffing of the bare metal.

The service performance of stainless steel parts remains one of the major factors in its increasing use. The material has proved out in virtually every brightwork application and is not subject to scratching, pitting, peeling, or other forms of corrosion. Its high strength also provides good dent resistance.

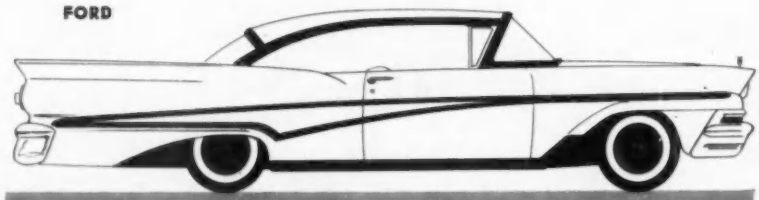
Stainless steel has also found a broad range of uses in other types of transportation. Trailers and railroad cars come to mind as two notable examples; as far as the latter is concerned, the lightest full-size passenger coach ever made utilizes stainless steel for the entire structure and exterior. Such lightweight designs are made possible by the high strength-weight ratio of stainless steel.

Due to its heat and corrosion resistance and strength - weight ratio, the use of stainless steel is also soaring in the aircraft industry; the new B-58 bomber, for example, employs stainless steel honeycomb panels in critical areas. Jet engines, afterburners, and structural parts in proximity to "hot" sections of supersonic aircraft are other places where stainless is used extensively.

Missiles are, of course, dependent on stainless and other high-temperature metals for protection of the warhead and instruments. The Boeing Bomarc missile, for example, has a stainless fuselage. The metal is widely used also in engine linings, exhaust nozzles, propellant tanks, valves, etc.

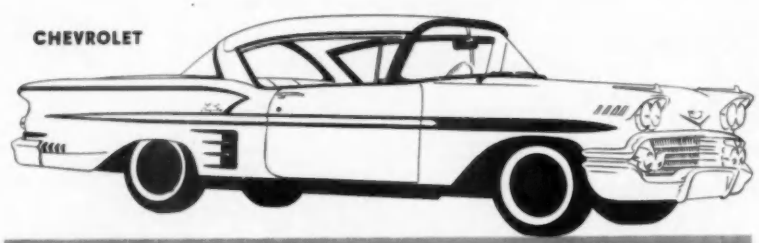
It is virtually impossible to pin down the average amount of stainless being used per car by the automobile industry this year and obtain a figure with any significance. More important are the specific uses to which the metal is being put. As shown through color overlays in these AI drawings, the use of stainless is going up both in terms of the number of parts being used and the increased size of moldings and stampings. The outlook is really a bright one for the stainless industry—and prospective car buyers.

FORD



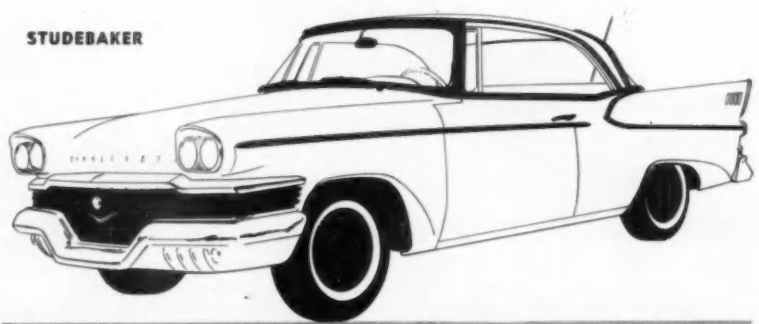
Stainless steel is given new treatment in the side molding design for the '58 Ford. Not shown are the mechanical components such as exhaust valves for which stainless is used by Ford.

CHEVROLET



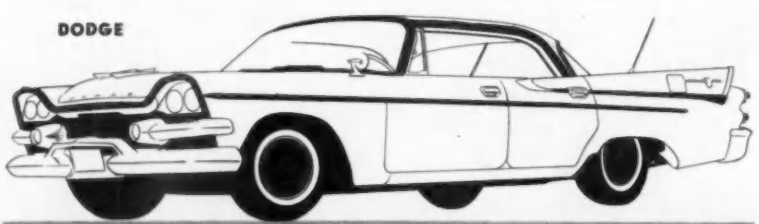
The major styling features of the new Chevrolet Impala are highlighted with stainless steel moldings. As shown they include the distinctive side molding and gull wing outlines. Other Chevrolet models follow suit in their use of stainless for similar parts.

STUDEBAKER



The Studebaker President bears a stainless steel grille with black enamel used to continue the grille design on the solid wrap-around.

DODGE



The '58 Dodge has a new stainless grille and continues its extensive use of the bright metal body moldings, wheel covers and the front end moldings.

LeTourneau - Westinghouse Model D Lo Dump in haul position has an overall height of 8 ft, 11 in. It is specially designed for low clearance applications.

Trends in the CONSTRUCTION EQUIPMENT INDUSTRY

By Kenneth Rose

PROGRESS on the Interstate Highway System was reported by Maj. Gen. Louis W. Prentiss, executive vice-president of the American Road Builders' Association, who gave some estimates of the status of the program as of the end of this year. It is estimated that about $1300 millions will be spent in 1957 for engineering services and acquisition of rights-of-way; about $400 million for work done by forces other than those of contractors, and $4200 million for net contract construction. A projection for 1958 is as follows:

Engineering and right-of-way acquisition	$1,500,000,000
Force accounts	400,000,000
Net contract construction	4,600,000,000
Total for the whole program	$6,500,000,000

The lead time for construction, or the time from the inception of the project to the moving of the first load of earth, is about 21 months. Estimates as to when the full impact of the work will be felt by construction equipment manufacturers range from spring to fall of 1958.

Low Silhouette Tournapull

LeTourneau-Westinghouse Co. has announced production of a new low silhouette version of one of its Tournapulls. The unit's height is only 8 ft, 11 in., while hauling; 11 ft, 8½ in. in dump position. To get even lower action, a "squat" feature has been built into the dump bowl mechanism to give a loading height of only 65 in.

A two-position air valve control operates the squatting action. At the travel position, a pair of air rams project mechanical lock bars which engage with stops on the bowl. At the other setting the rams retract the lock bars from the stops and allow the bowl to move downward. Raising and lowering of the bowl is accomplished by an electric motor which takes up or lets out on a cable. It has a standard rear dump, and the same 8-ft width as the standard Model D rear dump. The new model will be built to special order.

Equipment Production Leveling Off

Caterpillar Tractor Co., Peoria, Ill., announced the lay-off of 4200 more employees early in November in a move to bring its production in line with the reduced volume of orders. It has been pointed out, however, that these declines come from a capacity several times that of the immediate postwar period, and so represent declines from a very high peak rather than reductions from what had been considered normal output.

Most of the construction equipment manufacturers are watching inventories mount sharply as production outruns sales. There have been lay-offs and reduction of work schedules as they try to bring the two into a better relationship.

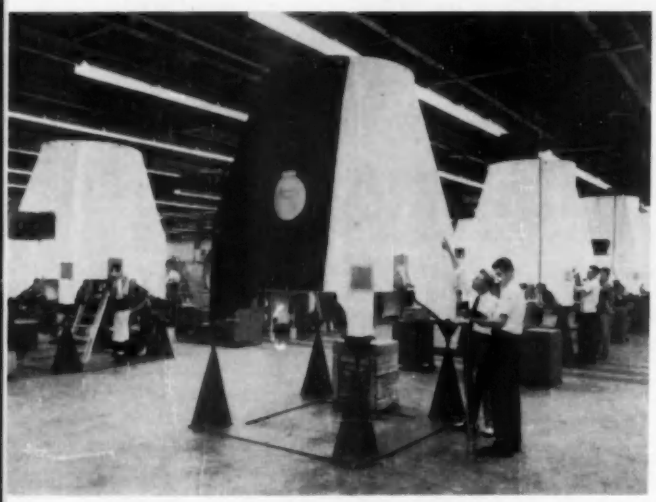
At the other side of the table is the contractor, who must have machinery to qualify his bid for road construction contracts. Clarence Killibrew, president of CIMA, and of the Construction Equipment Division of Clark Equipment Co., has stated that most manufacturers have now set up financing departments to help their customers with the purchase of equipment.

Highway Program Roadblocks

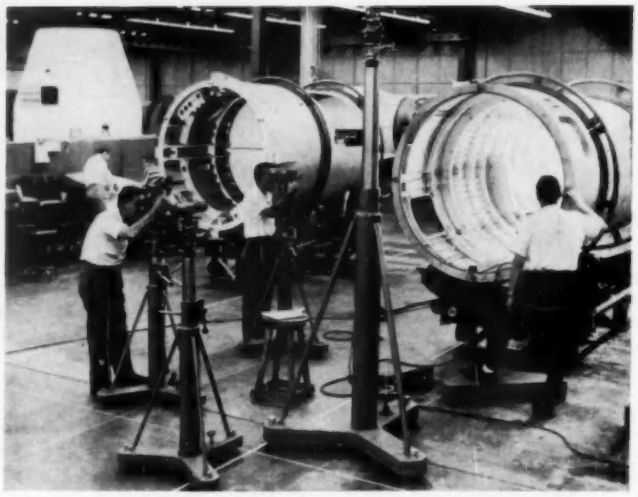
The two most serious roadblocks to progress of the highway program, according to Gen. Prentiss, are the shortage of highway engineers, and difficulties to acceptance of highway location. The first is being solved by the use of new techniques, such as aerial surveys

(*Turn to page* 154, *please*)

The Redstone Ballistic Missile Under Construction at Chrysler

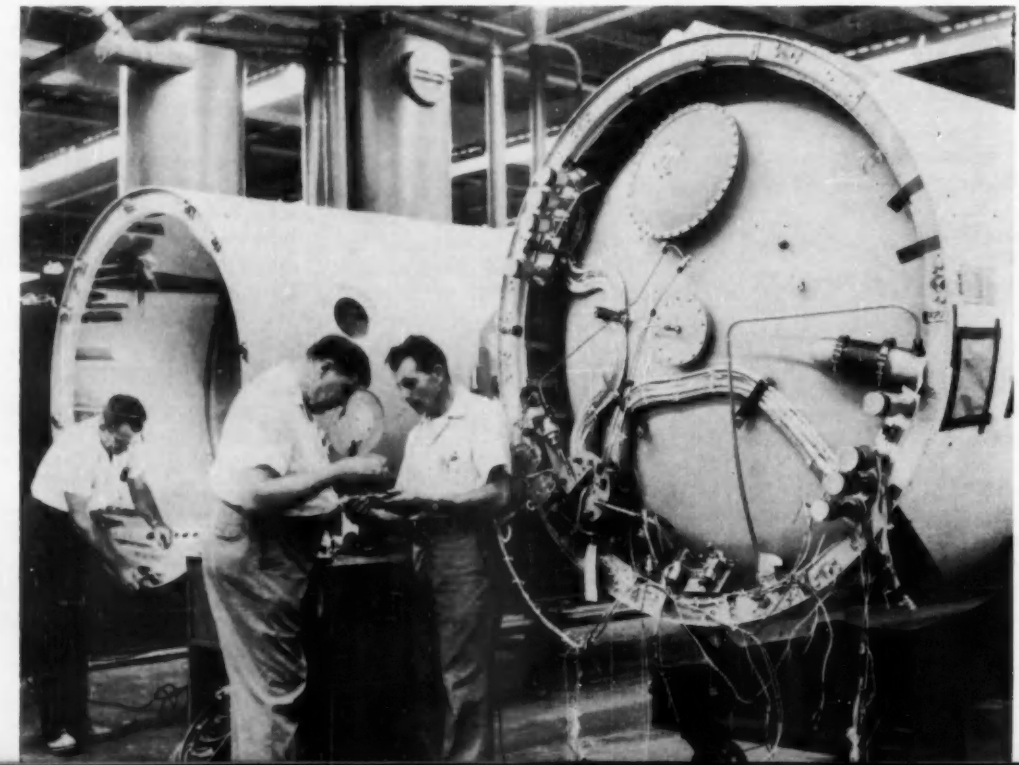


A technician performing final measurement on a Redstone tail section prior to the installation of the battery of electronic and mechanical devices which will provide control of this ballistic missile.



A top section of the Redstone is being checked prior to its being joined to the remaining components of the missile.

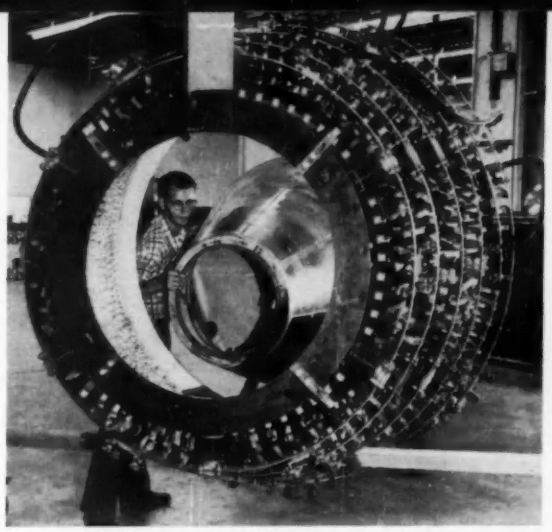
Electricians prepare to join the booster section shown above with a tail and top section which will then be taken to the firing deck for simulated flight.



PRESENTED here are some selected views of the Redstone ballistic missile manufactured by Chysler Corp. for the U. S. Army.

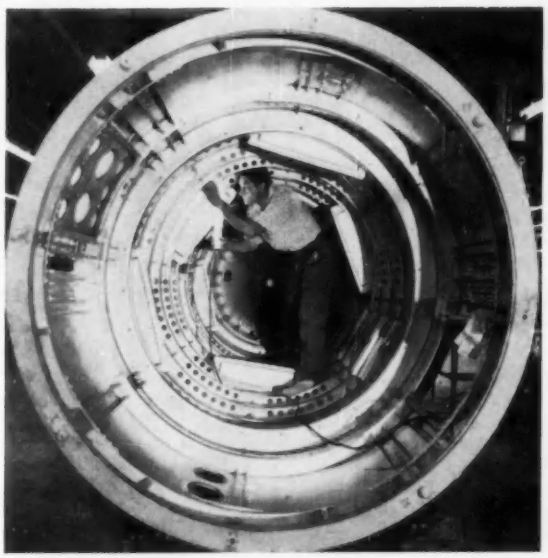
The 63-ft-long Redstone is a medium range weapon. A combination of a self-contained guidance system and extremely high speed makes the Redstone relatively immune to known types of counter measures.

Disassembled into two component parts, one consisting of the power plant and fuel tanks (34 ft long), and the other consisting of the control system and warhead (29 ft long), the missile will be transported on flat-bed trucks in combat areas, or flown to remote launching sites by cargo plane, together with its launching platform and field firing control system.



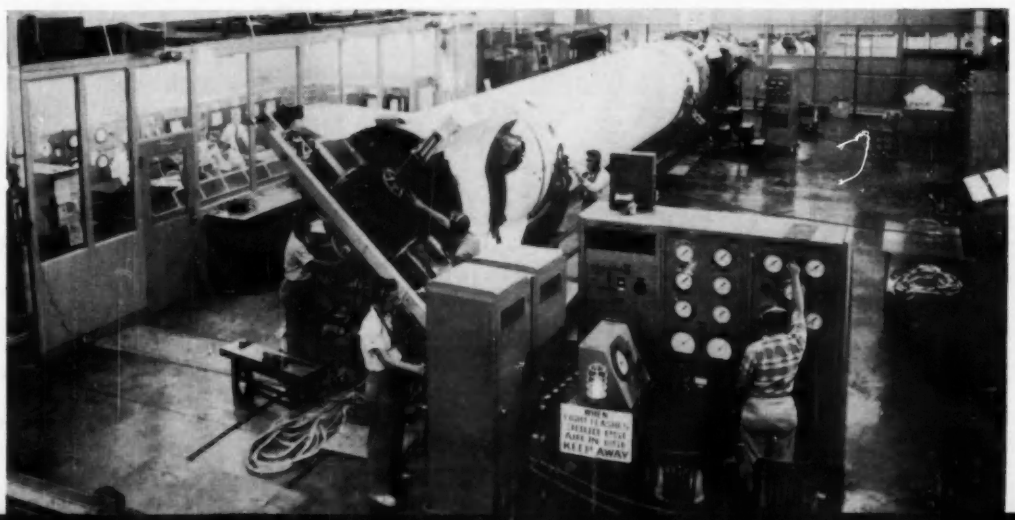
In order to duplicate by test the severe temperature conditions encountered when a ballistic missile re-enters the atmosphere, this circular oven was devised. Hundreds of individual quartz heating lamps are utilized in its construction. The nose of a Redstone missile being readied to undergo this test can be seen in the background.

An electronic technician assembles one of the many wiring harnesses used to transmit electronic impulses from the missile's brain to various control points throughout the weapon.



A technician makes the last visual check of a Redstone top section before it is moved to the assembly area where the internal equipment will be installed. The pinpoint of light in the background is the nose cone of the missile where the warhead will be installed.

Below, the Redstone missile is put through its final test before being delivered to the Army. This test simulates every flight condition possible short of actually firing the missile.



New Transfer Machine Lines for Cylinder Heads and Blocks ...AT CADILLAC...

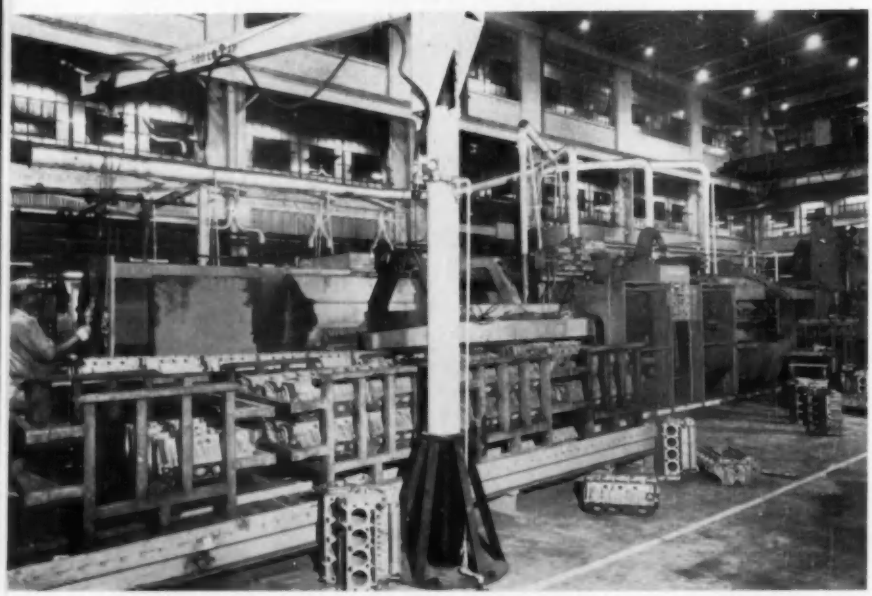
By Joseph Geschelin

PROFITING by an extensive amount of floor space released when the Cadillac press shop operation was moved physically to another plant on the east side of Detroit, the Cadillac Motor Car Division installed new transfer machine lines for the cylinder block and cylinder head of the 1958 V-8 engine. A major move for any manufacturer, this provided Cadillac with the opportunity of utilizing the latest types of transfer machines which not only make it possible to produce a larger volume of engines, but embody many features that contribute to new levels of quality.

The new transfer lines, described briefly here, are completely interlocked to make the entire cycle truly automatic from start to finish. However, because of the necessity for changing tools as well as to take care of any emergencies, the cylinder head line incorporates banks or floats at certain points to assure full operation even in the event of a shut-down of any station or section.

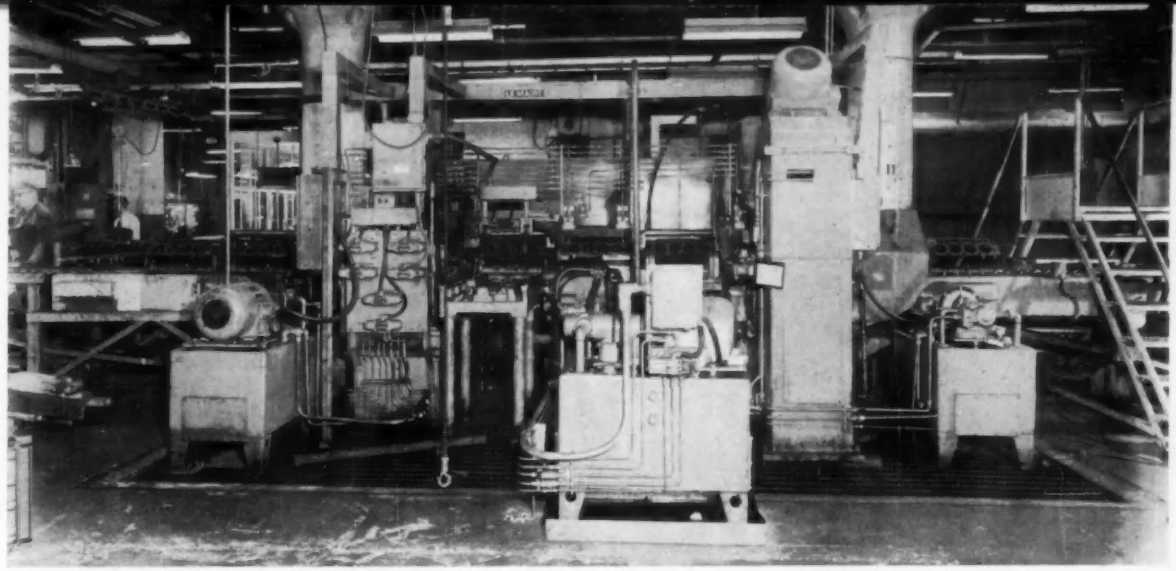
In approaching this new equipment program the management found it possible to introduce some individual operations that are new to Cadillac, although not necessarily new in the industry. One of the major examples of this is the adoption of the enormous horizontal Cincinnati surface broaching machines on both the cylinder head and cylinder block lines. Another important feature on the cylinder block line is the employment of Micromatic honing machines for honing the main bearing line to assure perfection of axial alignment, correction for size and roundness, and development of the desired surface finish.

The first operation in the cylinder block line is performed by this Cincinnati broaching machine. At station one the bottom side of the block is broached. The block is then transferred into a turnover which in turn locates the block in the second station

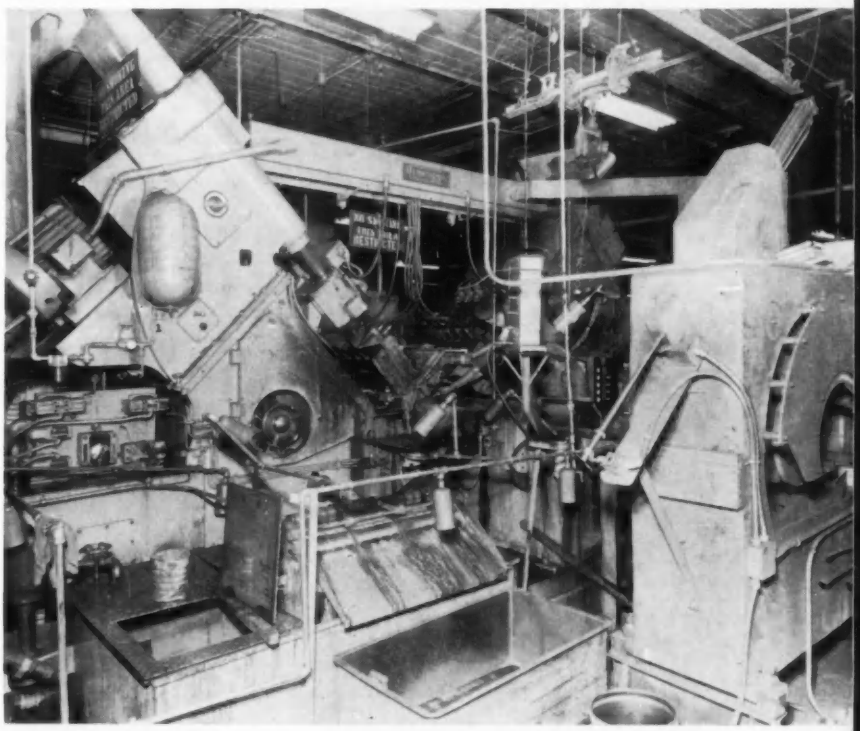


Let us consider first the cylinder block line. First operation is the surface broaching of all top and bottom surfaces in a four-station setup in the big Cincinnati surface broaching machine. The panrail, half-round and bearing locks are broached at the first station. The center station is for the roll-over. Then the bank faces and top surface are broached at station 3. Blocks are unloaded at station 4 and transferred to a four-station Baker drill setup for drilling and reaming two locating holes used for locating in all subsequent stations.

Cylinder bores now are roughbored in a V-type Ingersoll vertical boring machine, using boring cutters with cemented-carbide inserted tips. At this point the panrail is corrected by finish-milling in a Kearney & Trecker milling machine. This is one of the features of the Cadillac machine lines—the cor-



The Le Maire tapper on the cylinder block line. This machine probes all head bolt holes to see that they are drilled and blows out any loose chips, and then taps all head bolt holes and puts drain hole plugs on each side of the block



All cylinder bores are honed at one time in this 8-spindle Barnesdril. The size of the bores is controlled by the amount of fluid coming through jets in the honing tools

rection of critical surfaces following heavy metal removal. As a matter of fact, the next operation is the finish milling of the top cover surface in a Sundstrand milling machine. Then the block moves into a three-station Sundstrand special rise-and-fall machine for straddle-milling the five main bearings and milling notches for the bearing shells. The last operation in this series is the straddle milling of the ends of the block in a Sundstrand Rigid-mill.

Counterboring of six expansion plug holes, drilling of two water drain holes, and spot-facing of a $1\frac{1}{8}$ in. hole are done in a Baush special drilling machine. End-milling of a 1 3/16 in. diameter clearance at 16 points is handled in a LeMaire special drilling machine.

Drilling of all holes in the top face and both ends, including some chamfering and counterboring operations, is done in a 13-station W. F. & John Barnes transfer machine. A number of these holes are for oil galleries. At station 12 the holes are automatically probed and checked for clearance as a safety measure.

Next in line is a group of seven individual Baush special drilling machines, tied together by automatic transfer mechanism for feeding from one machine to the next. The first of these units drills eight water circulating holes, eight tappet holes, and four cylinder head dowel holes. The second unit drills eight tappet holes and 10 other holes. The third unit drills 34 cylinder head screw holes, as well as two oil holes four inches in depth, and core-drills a 1 13/16 hole.

The fourth machine chamfers 16 tappet holes and drills four cylinder head dowel holes. The fifth unit chamfers 34 cylinder head screw holes, finish-drills two oil holes, and mills a flat spot in 16 tappet holes. The sixth unit drills 10 holes and drills 16 oil holes in the tappet holes. The last of the Baush units in this group finish-reams the 16 tappet holes, four cylinder head

New 30 station Greenlee automatic transfer machine, each station of which handles two heads at a time. In all, there are more than 200 tools used at the 30 stations

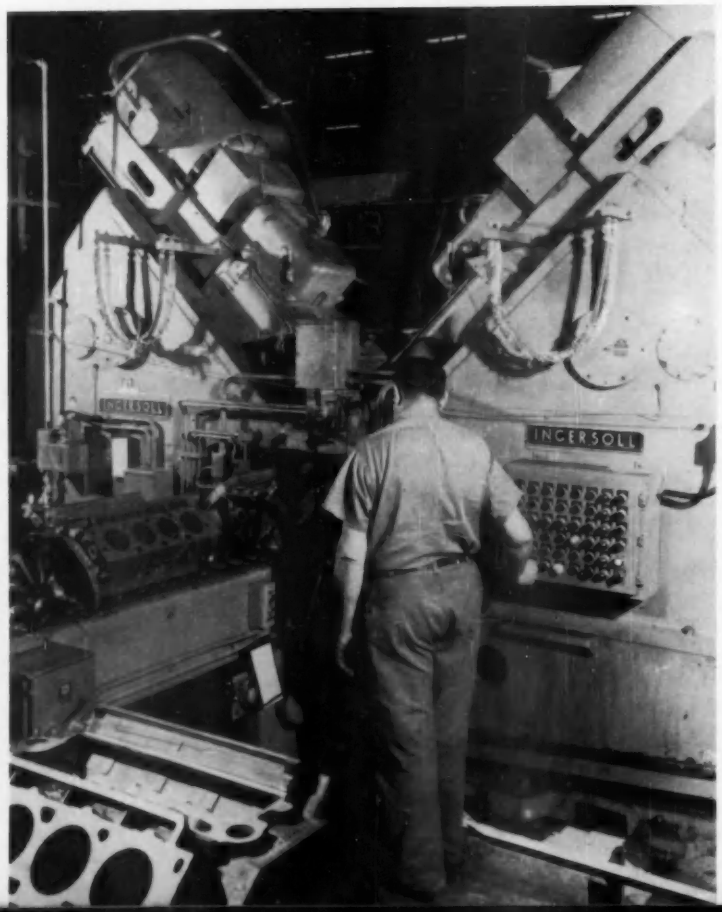
dowel holes, and rough-reams the distributor hole.

The holes in both banks, as well as two water drain holes, then are tapped in a LeMaire machine.

This is followed by the second operation on cylinder bores—semi-finish boring in an Ingersoll boring machine.

A 25-station Baush transfer machine now does the drilling of all holes in the bottom face, and drills and taps an angular oil gallery hole. It mills two pads, drills and counterbores 10 holes in the main bearing line, drills oil gallery holes, chamfers 24 panrail holes, taps holes in the pads and angular oil gallery, taps a horizontal vacuum hole. All holes in the bottom face then are tapped in a Fox tapping machine, handling 34 holes in all.

This Ingersoll honing mill rough-bores all eight cylinder bores at one time



The third stage of cylinder bore machining—chamfering the bores at the top and bottom—takes place in a Natco, two-way angular drilling machine. This is followed by the tapping of 26 holes in the top, front, and rear ends of the block in a 3-way Natco, combination vertical and horizontal tapping machine.

The fourth step on the cylinder bores is finish boring in an Ex-Cell-O two-way precision-boring machine.

The fifth and final step in finishing cylinder bores is that of honing in a new type Barnesdrill two-way angular honing machine. The special feature of this machine is that it is said to be the first production example of a new technique of fluid sizing developed by Barnes Drill Co., automatic sizing being controlled by means of a special fluid film. Incidentally, this operation is accurately controlled by the instal-

lation of a magnetic filter, as well as refrigerating equipment for maintaining a standard fluid temperature.

The block now goes through a Centri-Spray washer, then to inspection and grading of cylinder bores. It may be noted that cylinder bores are honed to a tolerance of 0.002 in., and grades then are selected in steps of 0.0002 in.

Now comes another of the major corrective operations — finish-broaching of the bearing locks in a horizontal Colonial broaching machine. Next comes the drilling of angular oil holes and other details, followed by the assembly of bearing caps.

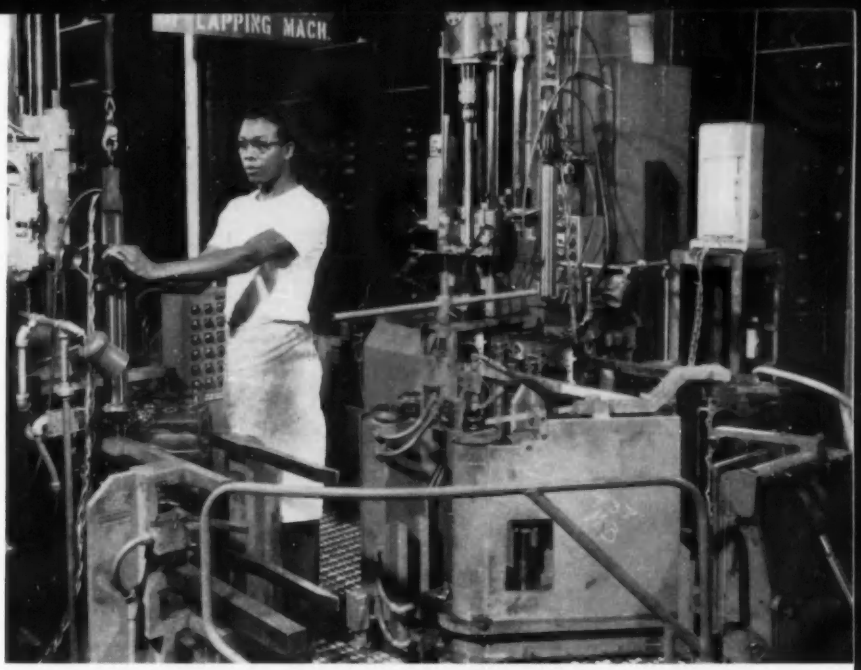
With the installation of bearing caps the block is ready for rough-and-finish drilling; core-drilling, semi-finish-boring, and finish-boring of the cam line; and rough-and-semi-finish boring of the main bearing line. These operations, together with some detail drilling and finish-boring operations, are performed in an 11-station W. F. & John Barnes transfer machine.

A LeMaire 4-station indexing machine does the semi-finish-boring of the distributor hole; and the drilling and reaming of the fuel pump drive hole.

The last of the corrective operations on the block, following the various stages of machining, is the semi-finish and finish-milling of the bank faces in an 8-station Ingersoll mill. This serves to assure the alignment of the bank faces with respect to the finish-bored cam and crank lines.

Finish-boring of cam line bushings, crank line diameters, distributor and oil pump shaft holes, as well as the finish-boring of the rear housing dowel holes, is done in an Ex-Cell-O precision-boring machine. Milling of oil slinger and oil retainer grooves; finish-straddle-facing and chamfering of the rear main bearing; and finish-facing of the housing surface, all are performed in a single setting in a Cincinnati special, two-spindle planetary mill.

The last major operation is one

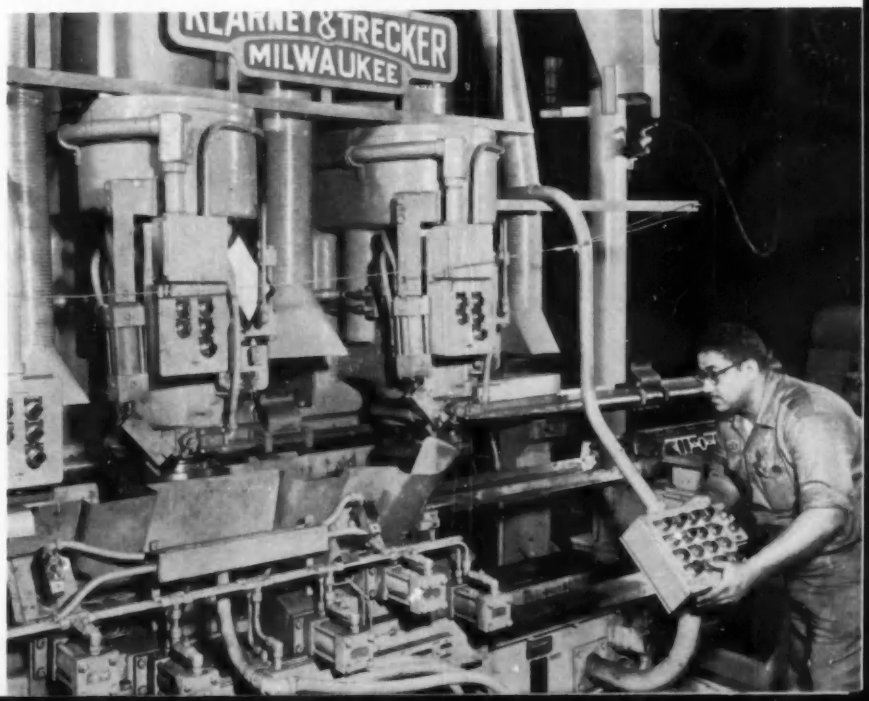


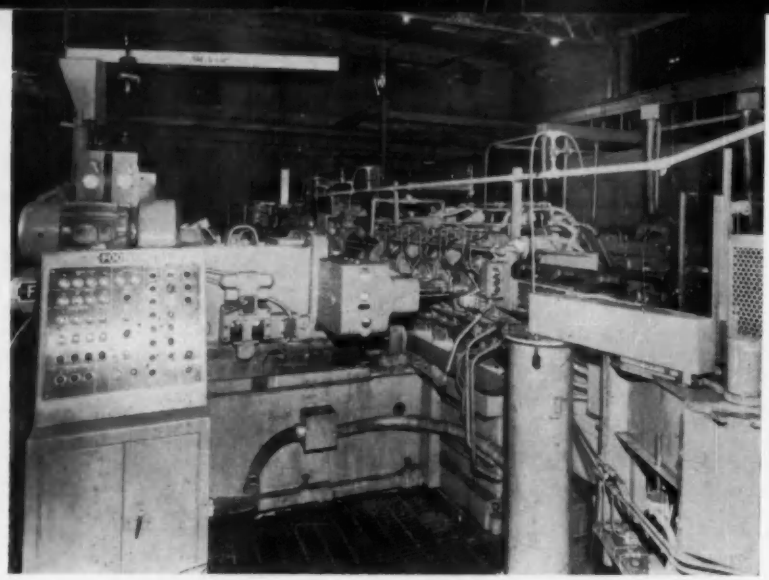
Honing of main bearing lines on Micromatic Microsize honers. The block is being honed in a vertical position for alignment and control of size

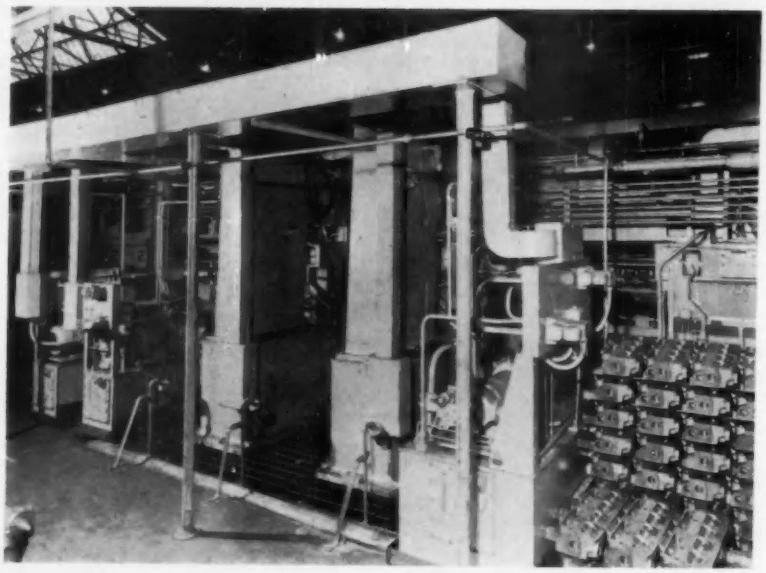
of the unique techniques adopted by Cadillac this year. This is the line-honing of the main bearing line in a vertical Micromatic Microsize honing machine. Two of these machines are required to maintain production volume and both are of extremely long stroke type. Bore diameter is held to a total tolerance of 0.0007 in.

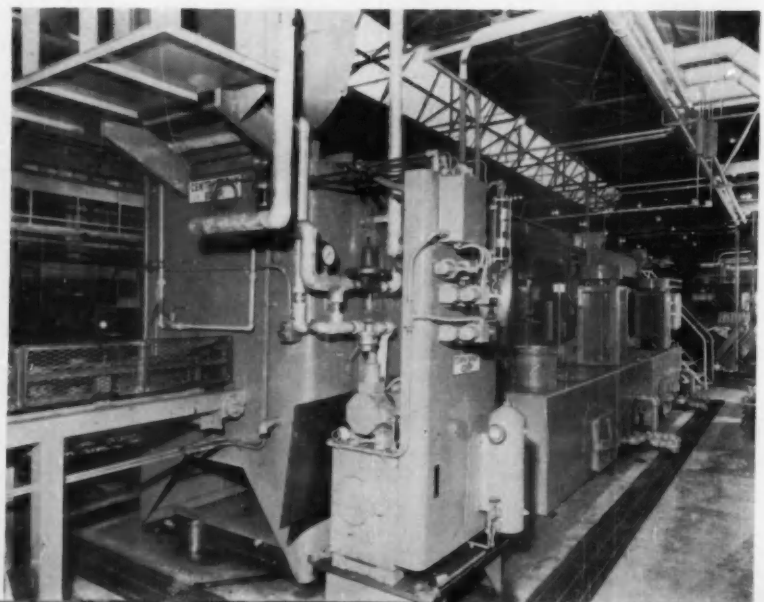
Now we can turn our attention to some of the major steps in machining cylinder heads. First operation is that of surface-broaching the faces of the heads in the big, horizontal Cincinnati surface broaching machine. Station 1 broaches the top of the head, the bolt bosses, and exhaust port pads. The heads are rolled over at the center station, and at station 2 have the joint face and intake face

Working on two heads at a time this Kearney & Trecker unit finish mills the tappet cover rail and three exhaust manifold pads. It is an eight station machine









broached. One of the practical problems with the operation of these giant surface broaching machines is in an accurate control of metal removal. If castings come oversize from the foundry they can easily break the tools on the ram. Cadillac solved this problem neatly by installing a steel barrier over the magazine loading chute. Only those castings that can pass through the opening freely are accepted, those that interfere are rejected.

Both ends of the heads are milled to size in a Cincinnati milling machine. From the mill the heads are transferred by means of a power transfer unit directly into a 9-station Greenlee transfer machine.

Up to this point the heads were handled one at a time. From now on all transfer machines are arranged to handle heads two at a time. The Greenlee machine drills, reams, and counterbores dowel holes; drills and reams a water circulating hole; tap-drills four cover holes; tap-drills for Dryseal pipe plugs. At station 8 the two heads are rotated 180 deg and unloaded into a power transfer unit where the work is probed for pushrod and tappet clearance and transferred into the next transfer machine. These clearance points, incidentally, represent a novelty since they are completely cored at the foundry and do not require drilling.

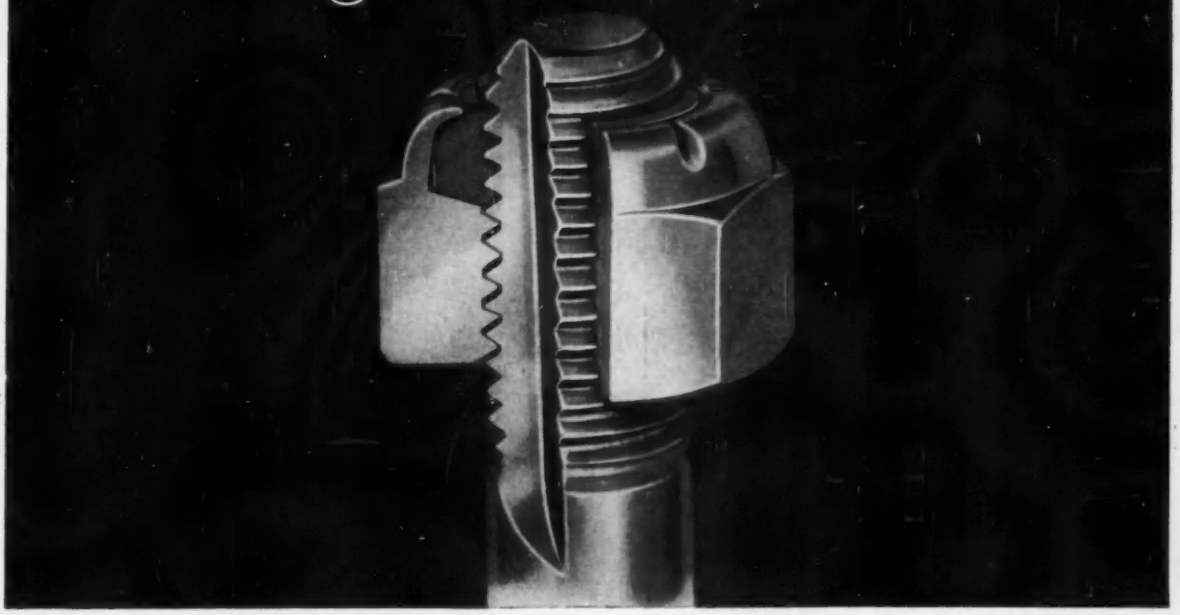
(*Turn to page* 150, *please*)

TOP—Ten station Footburt machine which drills, taps and counterbores holes at both ends of the cylinder head. It handles two heads at a time

MIDDLE—Among the jobs accomplished in this 26 station Greenlee transfer machine are: finish valve guide bushing hole; installation of the bushing; finish hole in the bushing; finish valve seat; finish valve throat; put finish dimension at top of the seat; finish the spring seats; drill and tap the thermo hole

One of two Centri-Spray cleaning machines on the head line. One is located immediately ahead of the 26 station Greenlee and one immediately behind the 26 station Greenlee. Each head that goes through this unit goes through three separate stages of cleaning, two of washing and one drying

The nylon collared Elastic Stop® nut never damages bolt threads!



The nylon locking insert  * will not seize threads, gall or remove plating

The red nylon locking collar is an integral part of an Elastic Stop nut. Oversize in diameter in relation to standard bolt tolerances, this insert grips the entering bolt threads with strong, smooth nylon fingers that dampen impact loads and resist turning under the most severe conditions of vibration or shock. The perfect fit between bolt threads and the locking collar also serves to seal off internal bolt and nut threads and to protect them against corrosion. Furthermore the nylon insert is impervious to gasolines, oils, salt atmospheres, cleaning compounds and common acids. The remarkable wear resistance of nylon plus its elastic recovery makes Elastic Stop nuts reusable through more than a hundred on and off cycles.

Because an Elastic Stop nut is a one-piece unit it is less expensive to install than castellated nuts and cotter pins, or double nuts. Equally important, it is a *stop* nut that *locks at any position on the bolt* without requiring secondary "safety" devices; it is simple to adjust precisely—it is easily wrenched off or readjusted. Elastic Stop nuts have been used by American industry since 1930 to solve the toughest applications on railroad, automotive, earth moving and farm equipment, as well as on all types of electrical machinery.

Elastic Stop nuts are available in sizes ranging from a watchmaker's 0-80 through 3", and in many standard finishes and materials including carbon and stainless steels, brass, duronze and aluminum.

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Please send me the following free fastening information:

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☐ Here is a drawing of our product. What self-locking fastener would you suggest?

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In Canada: SHAKEPROOF-FASTEX, Division of Canada Illinois Tools, Ltd., Toronto, Ontario

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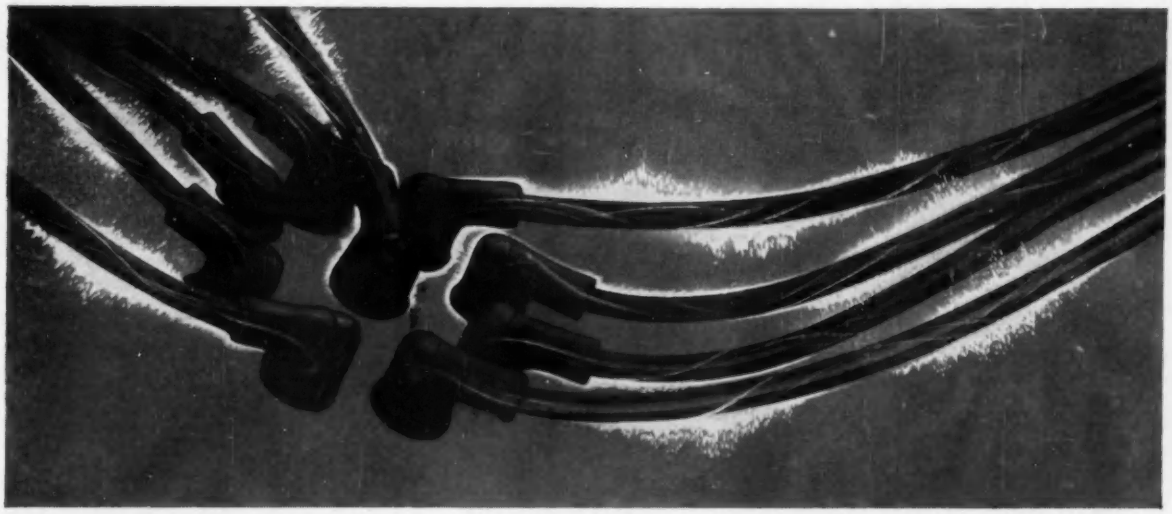
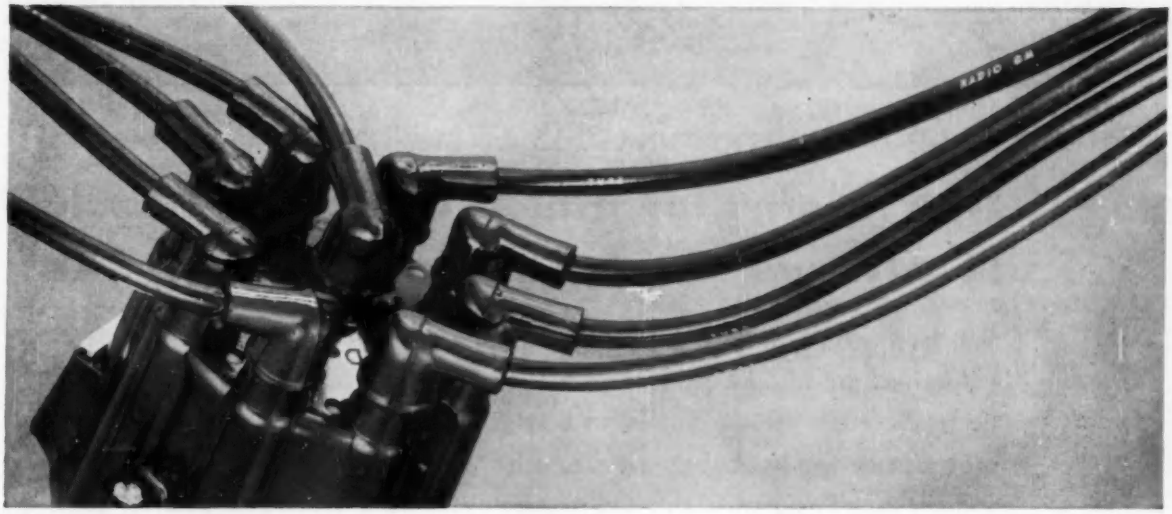


DON'T / *"broadcast" trouble through ordinary ignition cable!*



DO / *suppress Radio-TV interference with Packard T.V.R.S. cable!*

Packard Electric's exclusive T.V.R.S. cable carries the electricity that makes the ignition spark, while it simultaneously stops interference.

Thus, using *only* Packard T.V.R.S. cable, you successfully stop "broadcasting" ignition interference, which can drastically affect operation of car radios and neighboring TV sets. By distributing resistance over the entire wiring circuit, T.V.R.S. cable does a more effective suppression job than can be done any other way.

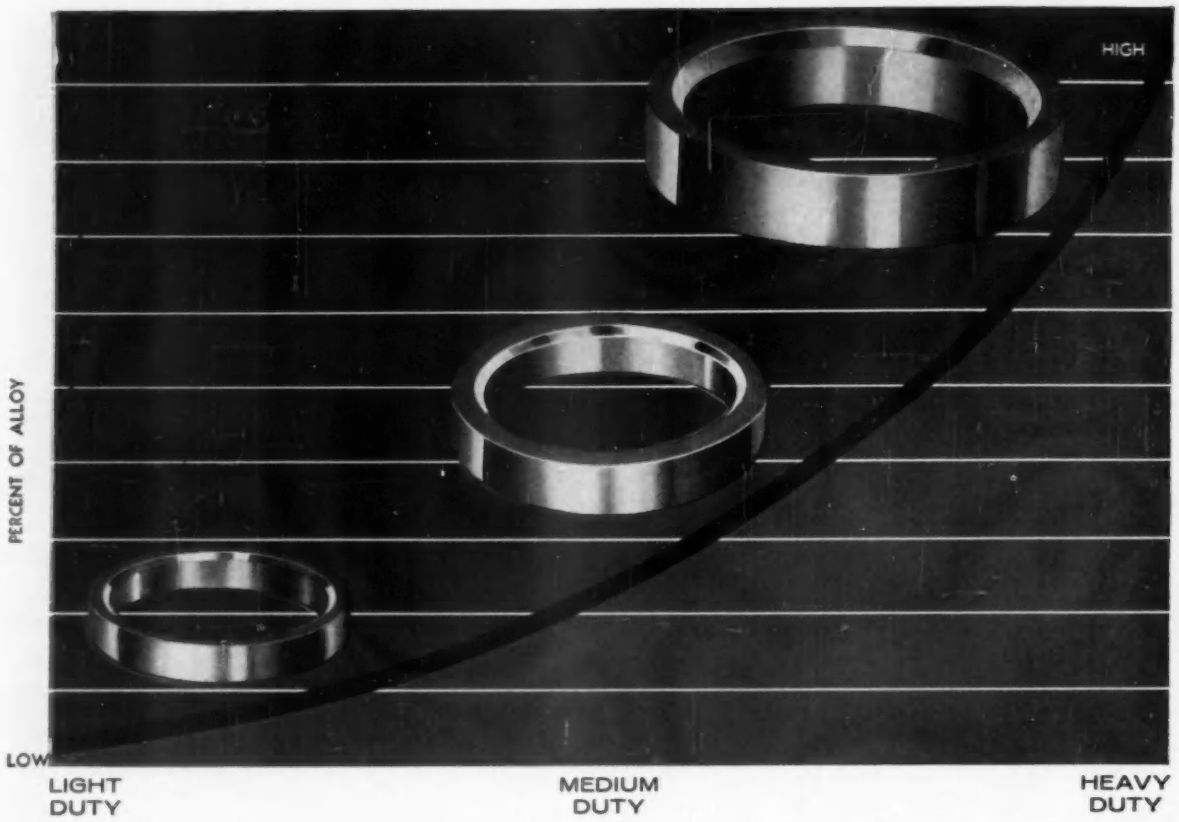
T.V.R.S. cable makes spark plugs last longer, too. The non-metallic conductor reduces electrical oscillations which cause spark plug electrode erosion.

A Packard Electric terminal-attaching process makes T.V.R.S. cable easy to use on any ignition system. And packaged replacement kits are available for all your service needs. Get the facts now. T.V.R.S. cables can eliminate a troublesome problem for you—and save you money besides! Packard Electric maintains offices in Detroit, Chicago and Oakland, California for your convenience.

Packard *Electric*

Warren, Ohio

"Live Wire" division of General Motors



The RIGHT Insert for the Specific Application Is Always the Most Economical

For heavy duty service involving extreme wear, corrosion, and oxidation, the highest performance high-alloy seat insert that can be produced is almost certain to be the most economical. On the other hand, for light duty service, a low cost insert of low alloy content may be adequate for the requirements. Eaton produces seat inserts "custom tailored" to meet the demands of each specific application — skillfully blends chromium, nickel, molybdenum, tungsten, cobalt, and iron to provide the right properties to overcome wear, corrosion, and oxidation. The result is inserts which will give optimum life at lowest cost, in the kind of service for which they are designed.

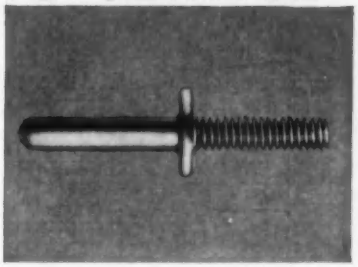
Call our engineers for a consultation on your seat insert problems.

EATON

SAGINAW DIVISION
MANUFACTURING COMPANY
9771 FRENCH ROAD • DETROIT 13, MICHIGAN

National SPECIAL PRODUCTS SERVICE

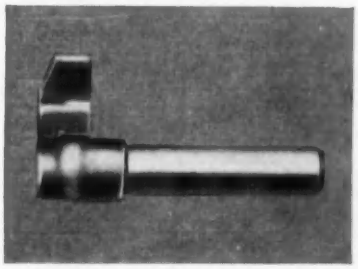
Precision parts with closely held tolerances and excellent surface finish, like this, can also be cold headed more economically and quickly.



Small parts like this can be produced, by cold heading, in huge hourly volume and at low unit cost.

Get strength at low cost with

COLD HEADED SPECIALS!



Intricate formations, like this, difficult or too costly by other methods, become routine production in the cold heading process.

You can make remarkable savings and get better parts in many cases by letting us duplicate and improve on parts you previously have had machined, cast or forged. It's possible with National cold heading!

What's more, we can quickly tell you whether cold heading would be an advantage for new designs.

Here's how National cold heading reduces unit costs . . . gives you better parts!

You save on production costs, because cold heading is fast . . . production rates of 50 to 300 pieces per minute are common. You don't pay for waste. Scrap loss in cold heading is negligible. You save on cost of extra operations, because cold heading eliminates them entirely or reduces their number. And most secondary operations, when required, can be performed automatically in mass production.

Cold heading assures strong, sound parts with good finish and excellent resistance to fatigue, shear and impact!

You're sure of strong parts because cold working *increases* the strength of steels and nonferrous metals. Subsequent heat-treatment or hardening can produce practically any degree of physical properties you desire.

You're sure of sound, clean parts because any defects, such as seams and inclusions, will open up in cold working . . . resulting in *automatic rejection.*

You're sure of superior fatigue, shear and impact resistance because cold heading produces continuous, unbroken flow lines in the grain of the metal . . . impossible to obtain by any other method.

You're sure of good surface finish, with a maximum of 50 micro-inch on cold headed surfaces. Cold heading won't cut or break the specially prepared, smooth, compressed and toughened surface of the rod.

National's cold heading specialists have many years of design and production experience. Combined with National's tremendous facilities for cold heading and secondary operations, this assures you of outstanding work and help in design and production of your parts.

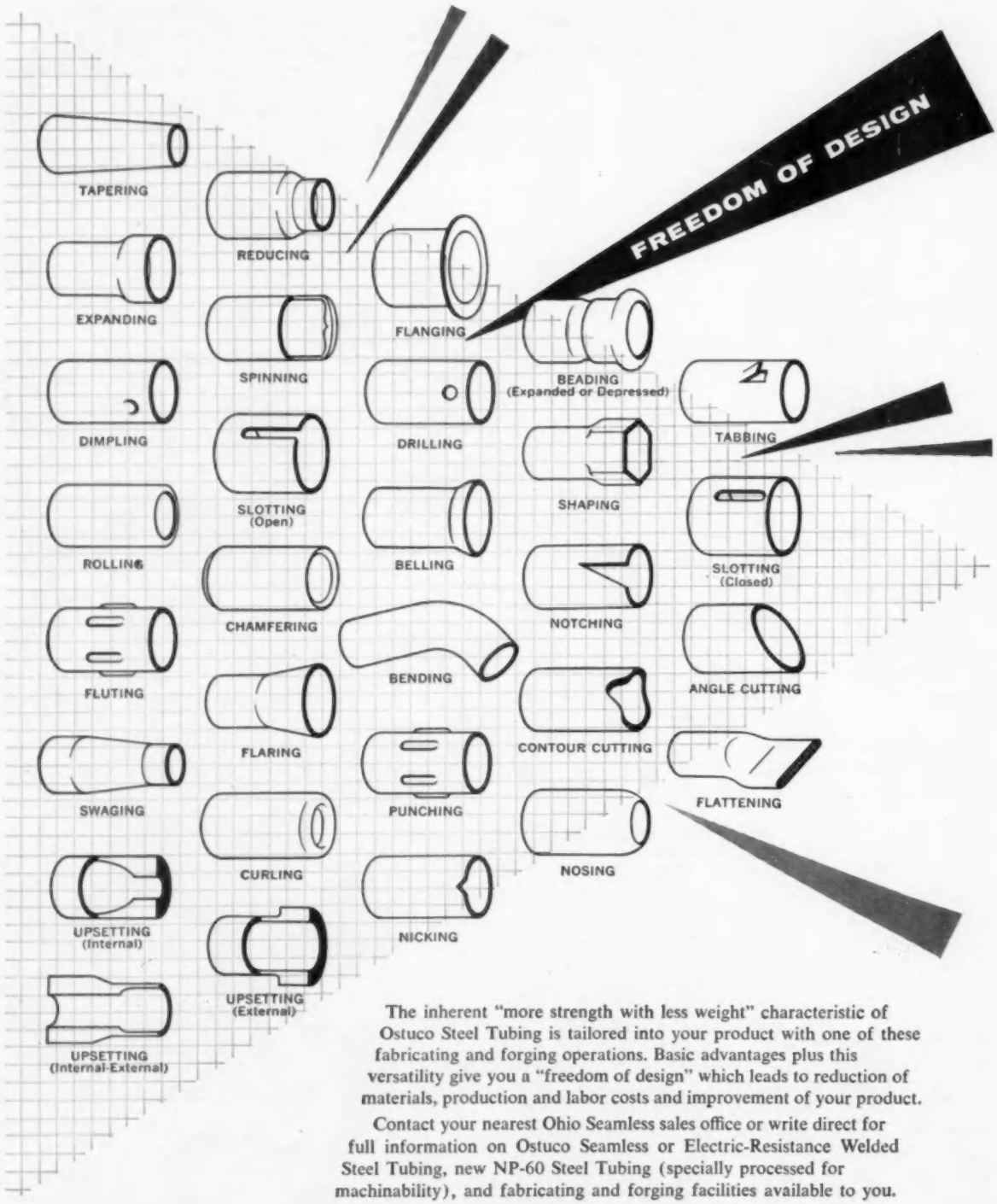
Write for National's booklet, *Special Products.* To learn more about what National cold heading can do for you, send us your specifications or call in your nearest National representative.

THE NATIONAL SCREW & MFG. CO. • CLEVELAND 4, OHIO

Pacific Coast: National Screw & Mfg. Co. of Cal. • 3423 South Garfield Ave., Los Angeles 22, Cal.

National PRODUCTS

Fasteners  **Hodell Chains**  **Chester Hoists** 



The inherent "more strength with less weight" characteristic of Ostuco Steel Tubing is tailored into your product with one of these fabricating and forging operations. Basic advantages plus this versatility give you a "freedom of design" which leads to reduction of materials, production and labor costs and improvement of your product.

Contact your nearest Ohio Seamless sales office or write direct for full information on Ostuco Seamless or Electric-Resistance Welded Steel Tubing, new NP-60 Steel Tubing (specially processed for machinability), and fabricating and forging facilities available to you.

OSTUCO TUBING

MANUFACTURED IN

SHELBY, OHIO

EXCLUSIVELY BY

OHIO SEAMLESS TUBE DIVISION

OF COPPERWELD STEEL COMPANY

SHELBY, OHIO • Birthplace of the Seamless Steel Tube Industry in America

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CANADA: Railway & Power Engr. Corp., Ltd.

EXPORT: COPPERWELD STEEL INTERNATIONAL COMPANY, 225 Broadway, New York 7, New York

News of the MACHINERY INDUSTRIES

By Charles A. Weinert

Machine Tool Shipments Continue to Exceed New Business Receipts According to Latest Report of National Machine Tool Builders' Association

New Machine Tool Orders Not Pacing 1957 Shipments

Net machine tool orders received during the month of October amounted to about $27.85 million. Gross new orders were about $33.1 million and order cancellations about $5.25 million, leaving the net indicated. During the same month, shipments amounted to about $61 million — more than double the net incoming orders.

For the 10 months of 1957, total net new orders were around $473 million, while shipments totaled about $740 million. As an overall result, the estimated order backlog of 6.0 months at the beginning of the year was reduced as of November 1 to the equivalent of 3.4 months. All of these figures, including the following, are contained in the latest report of the National Machine Tool Builders' Ass'n for metal cutting types only.

The following will give the 1957 record by months for both net new orders (after downward adjustments for cancellations) and for shipments (billings):

Net New Orders—1957

Month	Millions
January	$63.25
February	$58.2
March	$58.9
April	$51.3
May	$41.4
June	$43.1
July	$55.5
August	$44.5
September	$28.8
October	$27.85*
10 Mos. '57	$472.80*

* Preliminary figures, subject to later finalization and adjustment.

Gross orders for the 10-month period amounted to about $527.5 million, and cancellations totaled about $54.7 million.

Business from foreign sources totaled about $50.8 million net.

Shipments—1957

Month	Millions
January	$76.55
February	$77.7
March	$89.1
April	$87.8
May	$78.5
June	$82.95
July	$58.7
August	$63.2
September	$64.75
October	$60.9*
10 Mos. '57	$740.15*

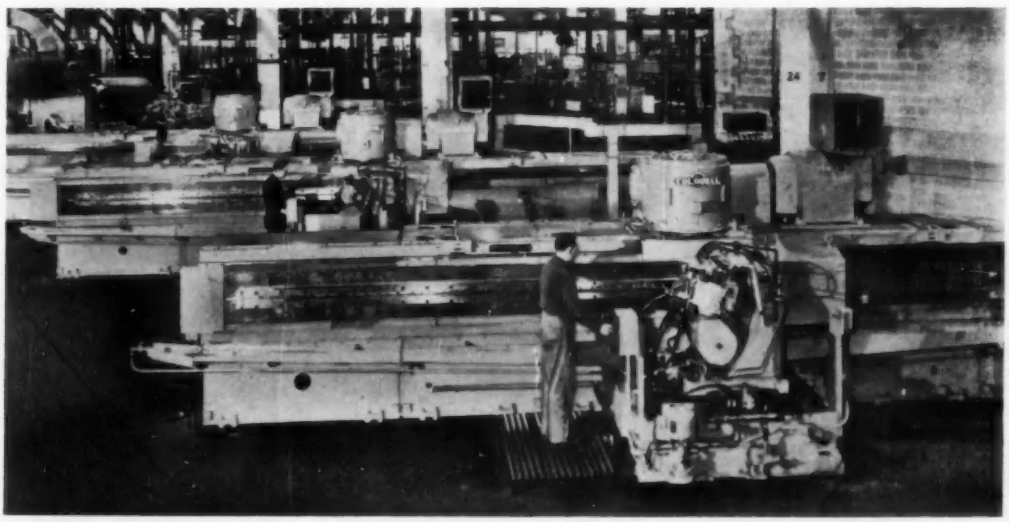
* Preliminary figures, subject to later finalization and adjustment.

Shipments to foreign destinations totaled about $78.75 million during the first 10 months of 1957.

Continental Machine Co. Increases Its Facilities

Continental Machine Co., maker of rotary tube cut-off machines, recently moved to a larger plant at 2345 W. Nelson St., Chicago 18,

(*Turn to page* 111, *please*)

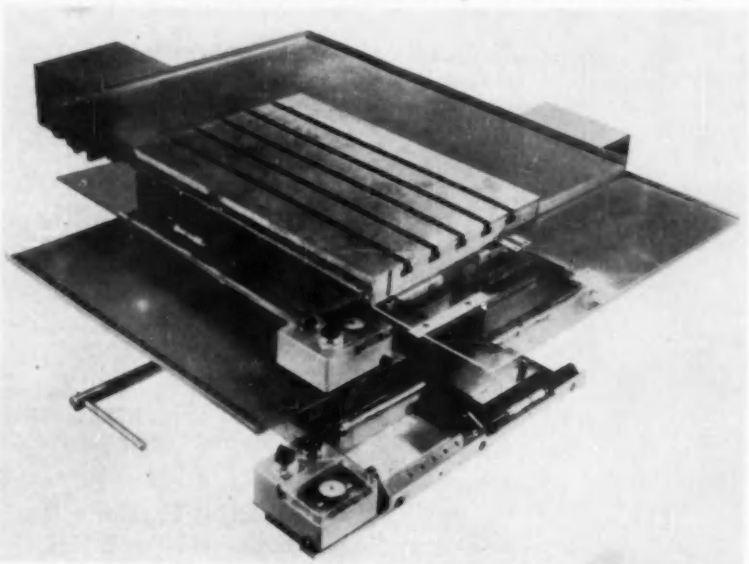


Precision broaching of jet engine compressor disks is being handled by this trio of Colonial machines in a major automotive plant. Radial dovetail slots are cut in stainless steel or titanium. The number of slots ranges from 27 to 103 per part, and seven different forms of disks are cut. Sequence is: shuttle in; broach at 30 fpm; shuttle out; index; and broach return (during index) at 200 fpm. Cycle time for each slot is 38.5 sec including index. The machines are new horizontal Electro Gear drive, 20-ton, 180-in. stroke models.

NEW PRODUCTION and PLANT EQUIPMENT

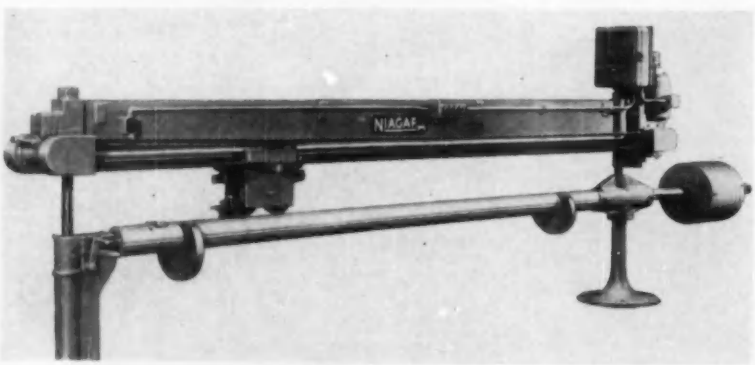
FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

Spacer Table for Automatic Spindle Positioning



This automatic positioning spacer table enables drilling and tapping operations to be accomplished without jigs. Drilling-reaming and boring requirements can be met without using boring fixtures. With the table mounted on a sensitive radial drill, four 0.437 in. holes are center drilled and reamed through one-in. steel plate in a floor to floor time of 14 minutes. The entire system operates on simple electrical principles. (Industrial East Co.)

Circle 30 on postcard for more data



Niagara power groover is obtainable with working lengths from 4 to 10 ft

Pushbutton Controls Featured on Power Groover

POWERED by a direct-connected reversible gearhead motor, a new power groover features centrally-located pushbutton controls. A built-in brake is provided to stop the carriage for rapid return stroke. Driven by a pair of endless chains, the carriage is returned to starting position automatically by means of a limit switch which reverses the drive. A built-in zero speed switch protects the motor and gears from overload by preventing reversal when the carriage is in motion.

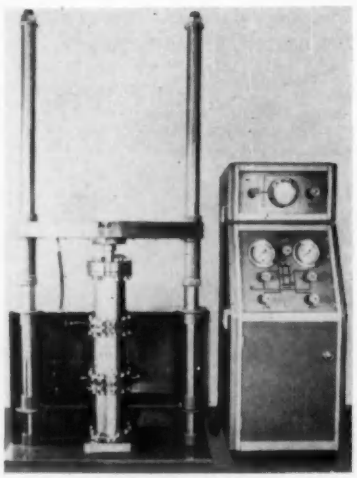
Eight models are available for single or Pittsburgh lock seaming. The groovers can be obtained with working lengths from 4 to 10 ft for handling mild steel up to 16 gage. *Niagara Machine & Tool Works.*

Circle 31 on postcard for more data

Shock-Testing Device

APPLICATIONS of a new shock-testing device include the shock-testing of components of aircraft, turbines, missiles, rockets, as well as industrial equipment. It simulates shock experienced by equipment in actual use.

Named the HY-6000, it produces high loads instantaneously with thrusts up to 40,000 lb. Shock pulses are controllable for both waveform and acceleration and deceleration level, whether the waveform is square, triangular, cosine or sine plus. The new device is essentially a six-inch diameter cylinder containing a piston which is subjected to differential pressures on its two faces. It has two moving parts, the piston and a floating seal. *Consolidated Electrodynamics Corp.*

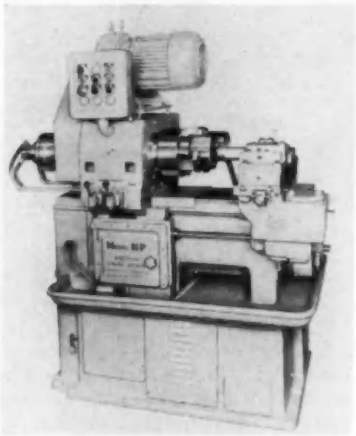


Consolidated HY-6000 shock tester

Circle 32 on postcard for more data

Boring Machine

PRECISION boring machine, Model NP, is available with either one or more precision spindles mounted independently on a fixed bridge. The spindles may be driven by separate

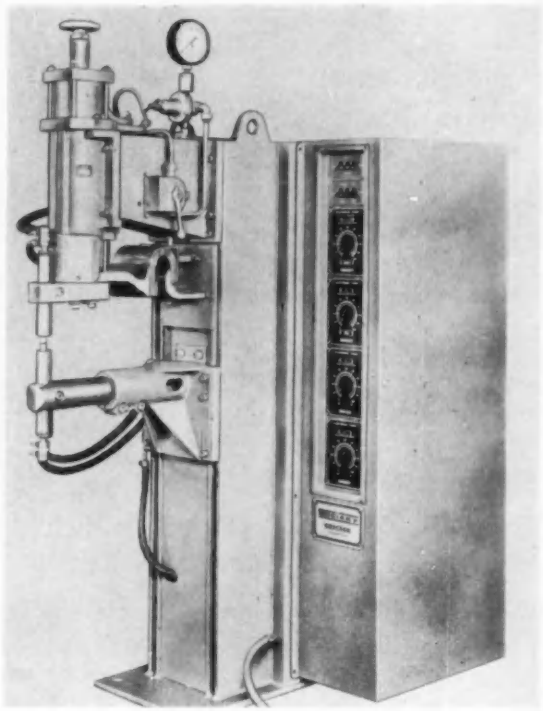


Senaca Falls boring machine

balanced motors when different spindle speeds are required, or by a single motor with tandem drive.

Three different types of spindles are available; a low speed spindle for speeds up to 2500 rpm, a medium speed for speeds up to 5000 rpm and a high speed spindle for speeds up to 10,000 rpm. Longitudinal movements are obtained by a drum can which assures positive feed. The machine is also equipped with a mechanism which permits variations in the length of the carriage stroke, rapid traverse and feed cycle without changing cams. *Senaca Falls Machine Co.*

Circle 33 on postcard for more data



Sciaky spot welder with a side mounted integral control, a fabricated frame with heavy vertical T slotted columns and a fully adjustable, copper alloy lower-arm covers a wide range of commercial welding operations

Air-Operated, Press-Type Spot Welder

DESIGNED to cover a wide range of commercial welding operations is a standard, air-operated, press-type low impedance, single phase spot welder. Available in 30, 50, and 75 KVA at 50 per cent duty cycle, it can be furnished with various throat depths. Electrode force up to 1575 lb is provided at 80 psi line pressure.

Features of the machine include a pneumatic, double acting cylinder head, and micro-finish cylinder walls along with molded, synthetic cup seals. Also a recirculating ball bearing system guided ram is provided to minimize deflection in the guiding ram. A low impedance secondary circuit with all static contacts silver plated for increased conductivity is among other features. *Sciaky Bros., Inc.*

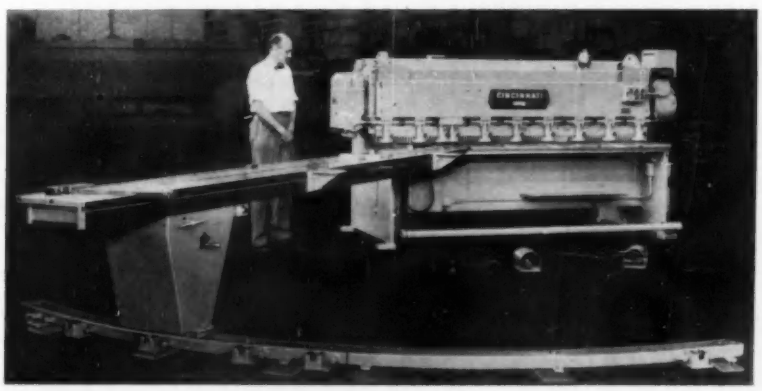
Circle 35 on postcard for more data

Shear Machine Equipped with a Special, Pivoted, Angular Shearing Gage

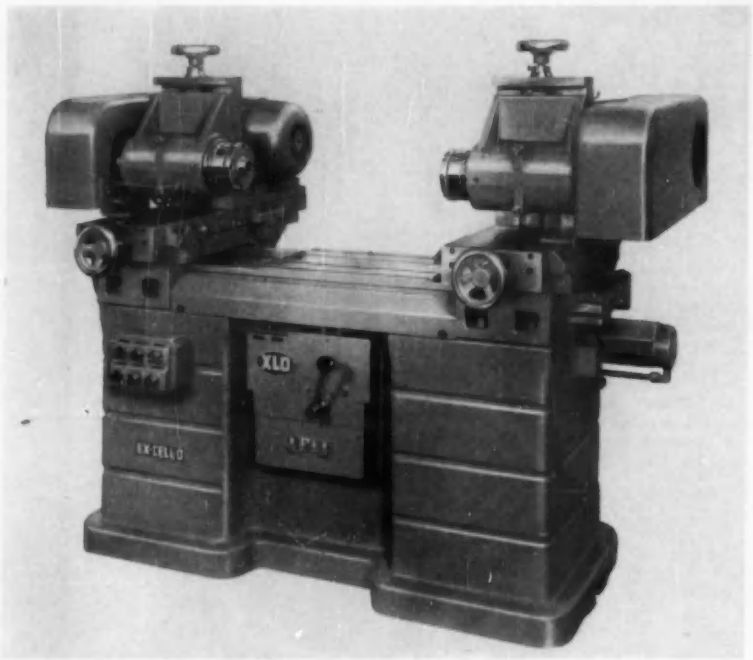
DEVELOPMENT of a shear machine equipped with a special, pivoted, angular shearing gage makes steel sheet shearing at any one of a number of different design angles possible. Total angular tolerance is within two minutes.

The pivot point for the gage is in the shear table. Traveling on a floor-mounted track is the gage support carriage. All gage stops are equipped with micrometer adjustments, which provide accuracy in gaging the length of the sheared pieces. Work is clamped by hydraulic holddowns which exert five tons of pressure. Operating speed is 65 strokes per minute. *The Cincinnati Shaper Co.*

Circle 34 on postcard for more data



Cincinnati 10 Series x 8 ft shear machine operates within angular tolerances of two minutes by use of an angular shearing gage incorporated with the unit



Ex-Cell-O precision boring machine equipped with special spindle slides

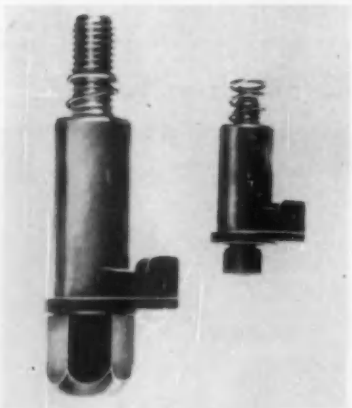
Precision Boring Machine for Universal Use

SPECIAL vertical and horizontal spindle slides of a precision boring machine, Style 1212-B, enables the unit to handle a wide variety of workpieces. Vertical spindle adjustment is 2 in., between 9 and 11 in., from the spindle centerline to the table. Combined with a four in. horizontal adjustment, this arrangement permits many boring tool positions.

A standard long stroke hydraulic cylinder is furnished to provide six in. of extra table travel giving a total of 18 in. Two-speed motors belt-drive the spindles through a range of single-sheave or multiple step pulleys. *Ex-Cell-O Corp.*

Circle 36 on postcard for more data

Swing Clamp Assembly



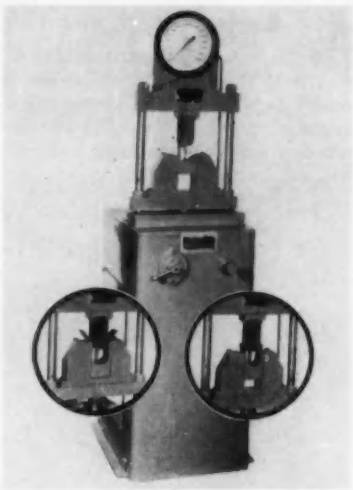
Recently developed, a new spring clamp assembly designed to provide safe work-holding and fast clamp release in restricted areas is now available. Assembly utilizes a spring-loaded shaft for quick maneuvering. (Jergens Tool Specialty Co.)

Circle 37 on postcard for more data

Testing Machine

INTRODUCTION of the new Model GB-124, guided bend testing machine has been made. Designed to test butt-welded samples, the machine is a self-contained unit and has its own hydraulic load applying means.

When testing a given thickness there is no need to remove any of the fixtures between tests, thereby keeping dies in alignment. As the lower die retracts at the conclusion of a test, an ejection device operates to remove the specimen from the lower die. The operator picks it out with his hands after the machine has completed its cycle. The tester is 70 in. high, occupies a floor space of approximately 18 by 24 in., has a 15,000 lb capacity, and employs a ½ hp motor. Two hydraulic valves control pressure and direction of piston travel. The machine conforms to all requirements of the American Welding Society, and The American Society of Mechanical Engineers regarding fixture design. *Steel City Testing Machines, Inc.*



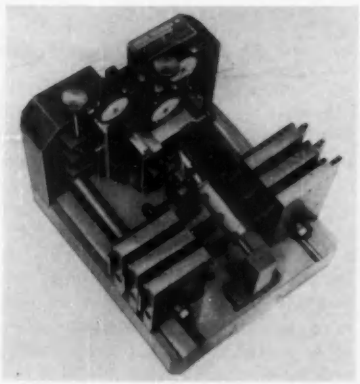
Guided bend testing machine, GB-124.

Circle 38 on postcard for more data

Jet Engine Blade Gage

USED for checking the accuracy of jet engine blades is a precison gage with airfoil template holders adjustably mounted on its base. The holders are positioned by interchangeable master change bars enabling blades of any length to be checked while maintaining template alignment accuracy.

A jet blade is put in a clamping device where it is located axially from the blade mounting surfaces. The clamping device is swivel and slide-mounted to show blade twist and displacement. The templates engage the foil section of the blade to show form accuracy as well as tilt and bow. *Stepard & Young Tool Co.*



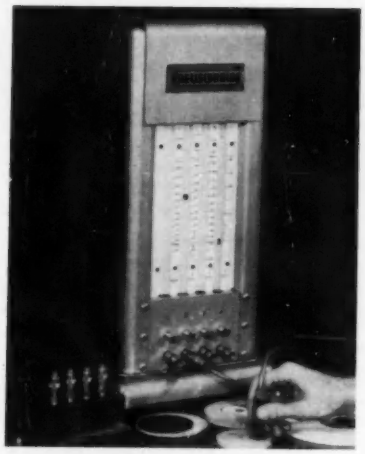
Shepard & Young jet blade gage device

Circle 39 on postcard for more data

Grinding Wheel Tester

DENSITY uniformity of abrasive grinding wheels is indicated by a Sheffield air gage. By flowing air into the grinding wheel and gaging the flow by means of scale graduations the device checks uniformity and detects filling.

Each air column in the four-column unit covers a specific range. The operator tests the wheel at several places with the pneumatic gage head and notes float fluctuation. Hard spots in the wheel are shown by low float positions and soft spots by high positions. *The Sheffield Corp.*



Sheffield grinding wheel tester

Circle 40 on postcard for more data

Template Machine

HOLES can be drilled in templates to within 0.002 in. with a new coordinator machine which is also applicable for producing drill jigs, simple fixtures and other precision work in flat sheet metal or plate. In operation, material is placed against an end stop and secured to a cross slide by work positioning clamps. Using a simple X and Y chart for hole locations, the operator sets the dimensions with two optical scanners in conjunction with fixed scales. As soon as location is made, the hole is drilled from the bottom through a carbide drill bushing. *Wiedemann Machine Co.*

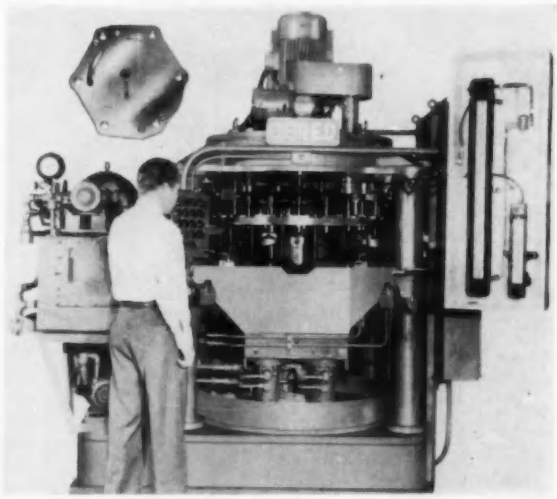
Circle 41 on postcard for more data

Machinery Mount

A NEW machinery mount which combines patented vinyl - sisal - cork pads with two adjustable wedges absorbs vibrations and permits instant leveling by the turn of a nut. Movement of the nut causes movement involving two opposite inclined planes, thus raising or lowering the machine foot under which the mount has been placed.

Compensating wedge design of the mount permits fine leveling adjustments, the ratio of movement on the wedge being four to one, activated by a bolt. The mount is available in three sizes and is named Wedgemount. *Clark, Cutler, McDermott Co.*

Circle 43 on postcard for more data



Jered vacuum pump tester tests 510 pumps per hour. Loading and unloading are the only manual operations necessary. Loading the machine trips or starts the automatic test pattern. The tester will operate whether it is partially loaded or all 16 stations are loaded.

Machine Performance-Tests Vacuum Pumps

ANNOUNCEMENT has been made of a new vacuum pump tester which is a multistation, self-contained machine designed to functionally-test rotary, vane-type, windshield wiper vacuum pumps. It is a 16-station unit with automatic lubrication throughout, and, is built to JIC electrical, hydraulic and pneumatic standards. The unit uses a 440-v current power supply and shop air pressure.

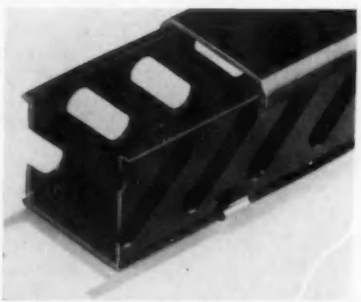
The machine will performance-test 510 pumps per hour with a one-minute time test of each pump. The test consists of a series of three checks: two vacuum checks and one torque check. The first vacuum check is a static check to prove that the pump is capable of pulling a minimum of 26 in. Hg. The second vacuum check is a flow check to prove that the pump with a displacement of 0.2 cfm of free air will pull six in. Hg. The torque check is given to prove that the internal, rotational resistance of the pump does not exceed four lb-in. of torque at 20 rpm.

The net results of each test are recorded on a memory system, visible at the unclamp station. Mercury monometers are built into the machine to provide an indication of the accuracy of the machine itself. The pumps are automatically clamped, unclamped and indexed. Vacuum clutches are used to provide the necessary drive torque. *Jered Industries, Inc.*

Circle 42 on postcard for more data

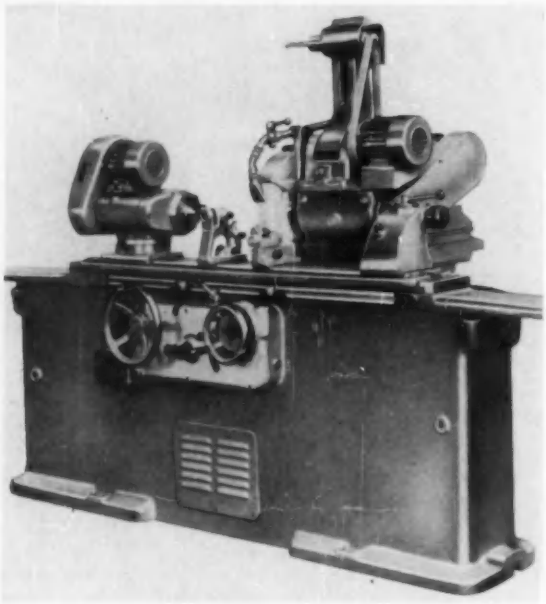
Closed-Slot Wiring Duct

TYPE C plastic wiring ducts feature overlapping closed slots over the full length of the duct. They are made of flexible vinyl plastic, are non-flammable and meet JIC requirements. Three types of mounting methods may be used: speed mounting with spring steel standoff clips, security mounting with threaded studs and standard flush mounting with screws through the base of the duct. *Panduit Co.*



Panduit closed slot wiring duct

Circle 44 on postcard for more data



Elgin Model R-7 Cylindrical Grinder.

Oil-Suspension Bearings in New Grinder

CYLINDRICAL grinders just introduced feature oil-suspension lubrication of the spindle bearings, which is said to prevent spindle flutter by eliminating frictional metal to metal contacts. They are available in two capacities, 13 by 40 and 13 by 60 in. with or without plunge-cut feed and automatic sizing.

A constant pressurized lubrication system forces protective wedges of oil between spindle and bearing surfaces at all times. Hand feed, fine feed by push-button and automatic hydro-feed with fine adjustment from 0.0001 to 0.001 in. can be obtained. Large easy to read dials indicate the feeds in 0.0001 in. When zero is reached the feed disengages automatically.

The spindle is hardened and ground and directly driven from an air-cooled dynamically balanced motor. Four work speeds are obtainable.

The workhead is driven by an enclosed externally cooled, dynamically balanced motor. It can be moved along the table and swivels on a graduated base for taper grinding or facing. The workhead spindle has variable speeds with a ratio of 1:9. The swivel-type table consists of two components with the upper part arranged to swivel ±5 degrees. The hydraulically controlled traverse table speeds are variable, from 2 to 315 ipm. *S & S Machinery Co.*

Circle 45 on postcard for more data

Dial Index Table

MODEL GEM-26, a 26 in. diam dial index table that will index a weight of up to 2000 lb may be equipped with as many as 12 stations. It is for automating drilling, tapping, riveting spinning, staking knurling, chamfering, welding and screw driving machines, gaging devices and other high volume operations.

Gray GEM-26 dial index table

The table will index to plus or minus 0.001 in. on a 24 in. diam work circle. Rotary air motor, solenoid valve and limit switches are standard equipment, electric and hydraulic motors are also available. *Gray Equipment Co.*

Circle 46 on postcard for more data

Drum Vacuum Cleaner

ANY 30 or 55 gal drum can be converted to a high-powered suction machine for pick up of oils, metal chips and similar machine shop waste by use of a new power head adapter unit. It is equipped with a one hp moisture proof, dust proof motor and a three-stage fan for suction.

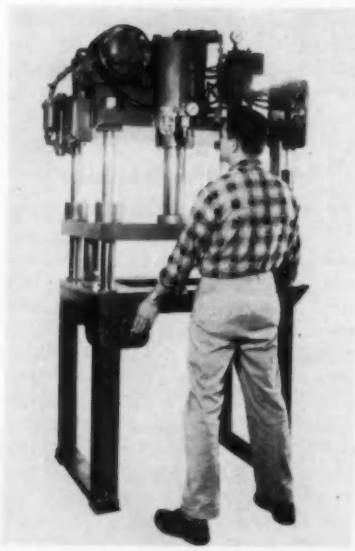
The machine is also equipped with a blower that can be used to blow dust and chips out of motors, lathes, and other machine tools. Suction stops when the drum is full. The sealed vacuum system develops a 78 in. water lift. *Advance Floor Machine Co.*

Circle 47 on postcard for more data

Heavy-Duty Trim-Press

HYDRAULIC presses using an accumulator with a closed shock-free, pressurized, hydraulic system achieve rapid cycling action with lower hp input. They are available in platen sizes of 15 by 18 up to 36 by 54 in. offering 12, 15 and 18 in. strokes, with shut heights of 5, 10 and 15 in. in 13, 20, 30, 40 and 50 ton capacities, in either two or four post types. All components including the motor, pump and reservoir are mounted on the top platen.

The electrical selector control provides a selection of manual, semi-automatic and set-up cycling. On manual, the release of one push-button stops the press, on semi-automatic the release of one push-button stops the approach or return, on set-up the platen can be floated or inched up and down. Typical operations include swaging, stamping, shearing, blanking, trimming, forming and drawing. *Bausenbach Hydraulics Div. of Buffalo Metal Container Corp.*

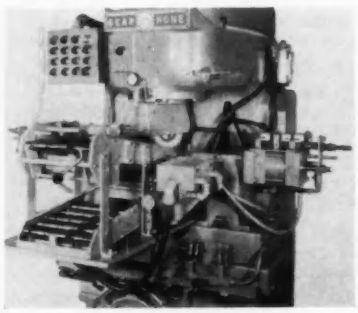


Bausenbach fast acting hydraulic press

Circle 48 on postcard for more data

Rocker-Type Loader

A ROCKER-TYPE loader for handling long shaft, unsymmetrical gears on both gear tooth honing machines and rotary gear shaving machines has a built-in gaging device, magazine



National loader for handling gears

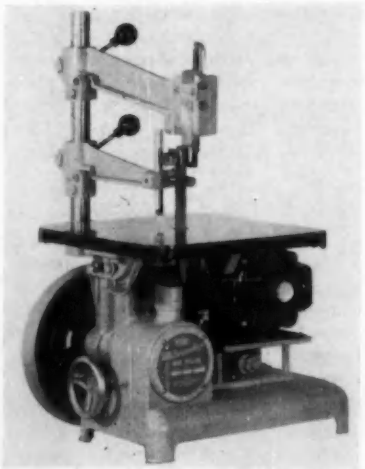
feed, and an air-powered rocker-type loading mechanism. A discharge chute that feeds finish-honed parts to the unloading position in front of the operator is also included.

Operation of the loader is entirely automatic when used in conjunction with standard gear tooth honing machines or rotary gear shaving machines equipped with suitable controls and air-powered head and tail stocks. *National Broach & Machine Co.*

Circle 49 on postcard for more data

Die Filer

VARIABLE speed and stroke lengths are features included on a new die filer designated Model FS-VSS. Through simple adjustment of two controls, the speed may be varied from 100 to 475 strokes per minute



Variable speed die filer Model FS-VSS

and stroke length varied from zero to two in.

Other features include the offset upper and lower chucks of ball jointed construction, improved swinging overarms, choice of three sizes or four-way tilting tables and an instant means for zeroing the tables. *Rice Pump & Machinery Co.*

Circle 50 on postcard for more data

Fork Truck Device

ODD and varied-sized cartons can be handled by a new multiple purpose attachment for forklift trucks. Included on the truck is a side shifter, a lift extender, a carton lip, a finger lift and a pair of hinged forks.

The attachment is mounted on a 2000 lb chasis with maximum 1000 lb capacity. Overall height with masts nested is 83 in. Up to 214½ in. can be stacked on the forks, 234½ in. with finger lift and 248 in. to the top of the upper carton lip. *The Baker Raulang Co.*

Circle 51 on postcard for more data

Zinc, Aluminum Cleaners

A NEW line of cleaners formulated to prepare zinc die castings and aluminum for Iridite coatings is designed to give long bath life and maximum cleaning efficiency. Each cleaner is supplied in powdered form and is completely water soluble. Each contains water-conditioning, anti-foaming and anti-caking agents that assure good rinsability and ease of use. They are packaged in 125 and 400 lb, full head, lined fiber drums. *Allied Research Products, Inc.*

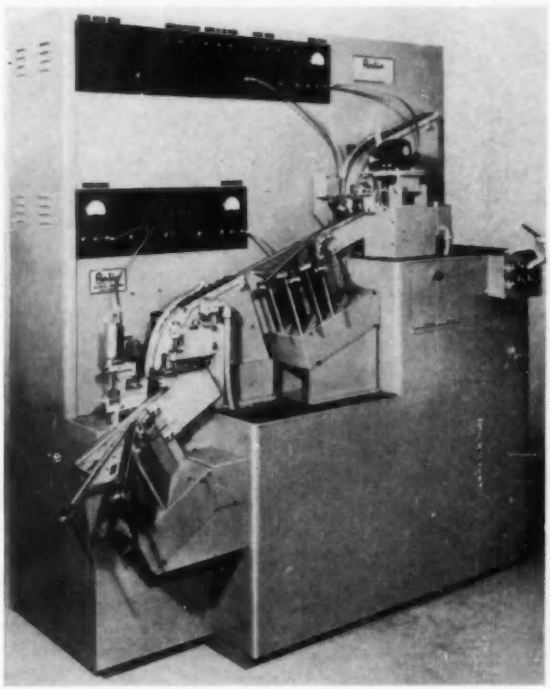
Circle 52 on postcard for more data

Machine Checks Concentricity of Engine Valves

AN electronic inspection machine built for checking concentricity as well as three other size dimensions of either in-process or finished engine valves is now available. The device automatically checks concentricity of the valve seat and stem, valve stem straightness, head thickness and overall valve length. It checks over 3000 pieces per hour.

The machine is controlled by an electronic system that receives signals from the compact gage heads regarding concentricity, straightness, thickness and length. This information is stored and related to solenoid-controlled gates in segregation chutes. After inspection the valve is directed to the proper rejection or pass chute. The gage heads operate on a radar-type reflected wave circuit using a frequency of 30,000,000 cps. They operate to 0.000001-in. with 100 per cent repeatability. The circuit is divided into packaged units. The machine requires a floor space of about 6 by 3 ft. *Arlin Products, Inc.*

Circle 53 on postcard for more data



Arlin automatic inspection machine checks automotive engine valves for seat and stem concentricity. Also stem straightness, head thickness and length; at a rate of over 3000 pieces per hour.

LeBlond Rapid Borer controls chip form by tool angles and proper feed and speed

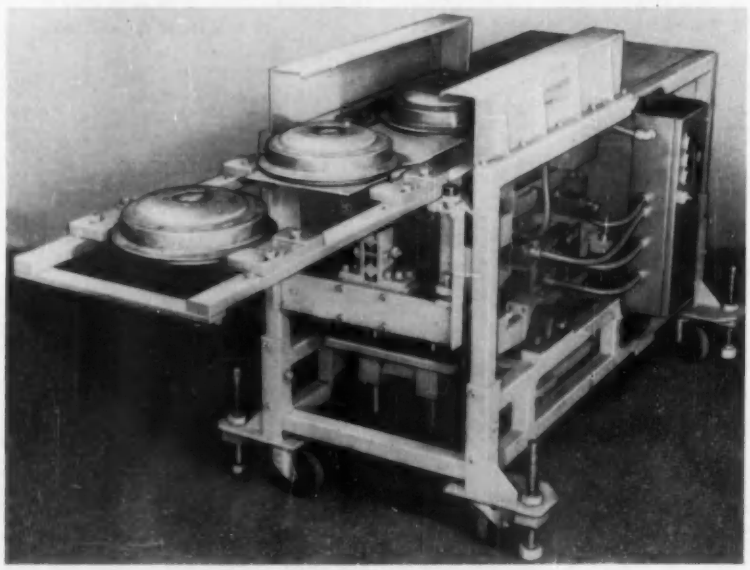
Boring Machine Accommodates High-Speed Tooling

HAVING a capacity for boring holes from 5/16 to 4¼ in. diam, a new Rapid Borer is now on the market. It is suited to work that is, or can be made symmetrical for balance in rotation; round, square, octagonal, tapered or stepped. It also handles identical parts which can be bored as one piece, then cut apart.

Cutting oil is forced between the cutting bar and the whole wall, forming a continuous bearing. It flushes back through a hole in the boring head and bar and carries away the chips as it goes. Features of the new machine include high spindle hp, a large volume of cutting oil and the final drive to the spindle is through belts. *LeBlond Machine Tool Co.*

Circle 54 on postcard for more data

Combination Transfer Feeding and Unloader Unit



PAS lift-and-carry combination feeding and unloader unit

A NEW standard lift-and-carry type combination transfer feeding and unloader unit for handling stampings in pressrooms has recently been made available. The unit lift mechanism operates in a true vertical direction under the control of close-fitted guide bars. Both lift and transfer motions have adjustable strokes. Air-operated, electrically-controlled air cylinders control the motions of the transfer bar. One cylinder raises and lowers the bar assembly; the other controls the forward and reverse motions.

This standard machine occupies a floor space of about three by eight feet and is approximately 42 in. high. Length depends on press spacing in fully automated lines. *Press Automation Systems, Inc.*

Circle 55 on postcard for more data

Inert Gas Welder

INERT gas shielded arc welding equipment, independent of water lines, permits the operator to change welding stations without installing water lines or changing hose connections. The "Circoolator" (water tank with motor driven pump), used in combination with the ac-dc welder, provides an independent water supply for cooling the torch. The tank is a 20 gal terne plate tank, rust-proofed and baffled. On the removable top plate is an all bronze rotary gear pump with piston finished shafts of stainless steel coupled to a 1/3 hp motor for operation on single phase, 60 cycles, 110 v. *Hobart Brothers Co.*

Hobart inert gas welding outfit

Circle 56 on postcard for more data

Parts Container

A HEAVY duty cargotainer designated Model 125 has been designed as a rigid container for handling heavy castings, stampings, gears, shafts and similar items. Size is 48 by 53 by 38 in. high. Capacity is 6000 lb.

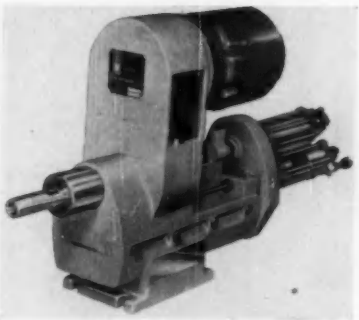
Made of wire mesh it affords visual inventory and cleanliness. The base construction is of heavy duty channel. The new device also features runner type supports. *Tri-State Engineering Co.*

Circle 57 on postcard for more data

Automatic Drill Unit

An automatic drilling unit which on receiving a small momentary electric impulse will perform a complete machining cycle: drill, ream, counterbore, spot face, or tap any machinable material. Tapping may be done by the addition of a tapping head or by slight modification of the standard unit.

The depth stop and rapid approach check engagement are positive mechanical stops. To maintain accuracy, off center spindle loading has been minimized by mounting the air cylinder, which pushes the spindle forward, directly in line with the drill spindle. Rapid approach arresting and feed rate control are provided by a small, sealed hydraulic check unit mounted parallel to and independent of the air cylinder. Depth is controlled by a positive adjustable screw stop and micro switch.



Gotha self contained drill unit

Capacity is ⅛ to 9/16 in. drill in mild steel, drive is by timing belt or V-belt. Spindle speeds range from 300 to 3600 rpm, ½ to 1 hp. Weight is 115 lb complete with ¾ hp totally enclosed fan cooled motor. *Gotha, Inc.*

Circle 58 on postcard for more data

Coolant-Lubricant Unit

A coolant-lubricant package has been designed to provide a constant flow of oil to a "Dynamic" press drive. It is for use on metal stamping types of presses. A separate system mounted on the same reservoir provides positive lubrication to the clutch bearings.

Suitable gages and protective switches are provided so that prompt signals are given in case oil or water flow is interrupted. Reservoir capacity is 150 gal, flow rate is 50 gpm. The unit consists of a five-hp motor, pump, filters, heat exchanger and bearing lubrication. *J. N. Fauver, Co., Inc.*

Circle 59 on postcard for more data

Cincinnati heating machine with spindle speeds variable from 15 to 375 rpm

Selective, High or Low Flame Heat Treating Machine

Recently introduced, a selective flame heating machine which embodies the building-block principle of construction, is applicable where high or low heating capacities are required.

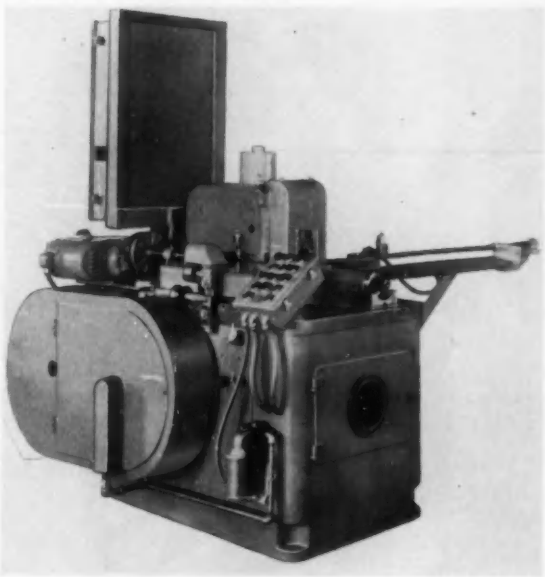
The flat-bed base unit acts as the supporting member for work-holding and handling fixtures and flame heads. The base houses a large volume quench tank with high-capacity heat exchanger, automatic quench agitation system and a large work removal conveyor which can be timed to operate continuously or intermittently with each heating cycle. Rhomboid type flame heads with removable tips are normally employed in conjunction with the rotating spindle work unit. An electronic temperature control automatically stops the heating cycle and causes the work piece to be dropped into the quench tank when it is at the desired temperature. *The Cincinnati Milling Machine Co.*

Circle 60 on postcard for more data

Tube Cut Off Machine

The range of tube sizes that can be cut on a standard tube cut off machine has been increased from 2 to 2¼ in. OD to accommodate all sizes from most tube mills. An air mist cutting oil system has been incorporated to increase cutting blade life. The lubrication system is automatic. The machine can cut off tubing in excess of 6000 pieces per hour. Deburring is not necessary in most applications. (Grieder Industries, Inc.)

Circle 61 on postcard for more data



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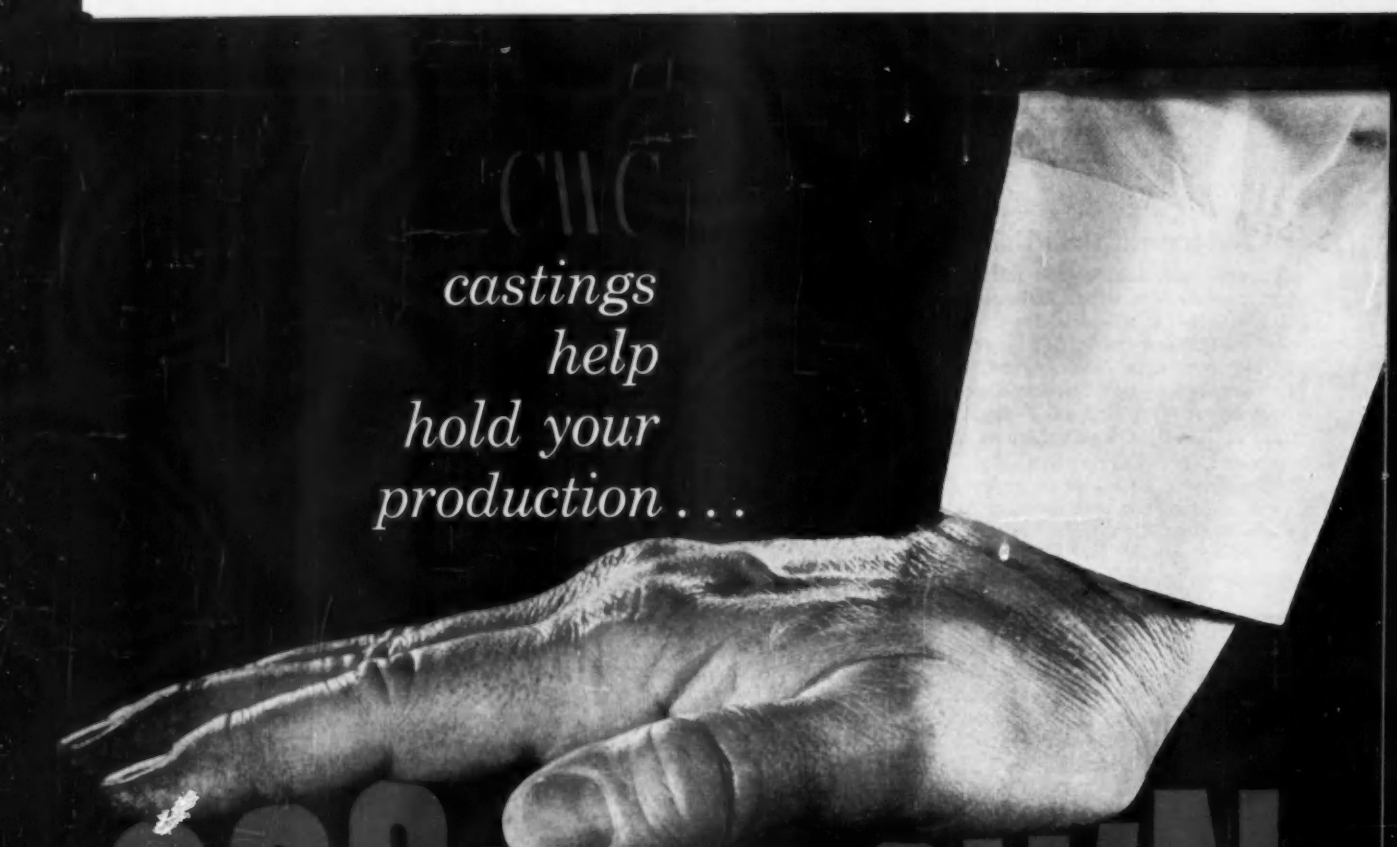

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Campbell, Wyant and Cannon, one of the nation's largest production and jobbing foundries, produces grey iron, alloy iron and steel castings of consistent uniformity—quality castings that lower production costs! Because CWC castings measure up to such exact specifications, machine shop rejects are greatly reduced . . . and time and cost consuming inspection and re-working periods are kept to absolute minimums. Here, creative metallurgical engineering, quality control and mechanized methods assure improved product performance. CWC employs spectrographic analysis of metals, radiographing by million volt X-ray and various types of pre-production planning and tests to maintain the highest quality! On-time delivery of castings keeps your operations on schedule.

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FREE LITERATURE

Induction Units 1

Twelve page catalog T-1067 describes high frequency induction units and accessories for rapid high temperature combustion of laboratory samples. *Lindberg Engineering Co.*

Sculpture Machines 2

Four page bulletin CRS-47 describes a line of tracer controlled sculpture machines used for contour and profile milling in a wide range of metals. *Colonial-Romulus Div., Colonial Broach and Machine Co.*

Metal Processing 3

Rolling mills, gang slitters, wire flattening lines, roller levelers and related metal processing machines are described in publication 1057, 12 pages. *Stanat Mfg. Co., Inc.*

Silent Chain Drives 4

Book 2425, 88 pages, contains detailed engineering data on silent chain drives. Tables of service factors, ratings, chain length and center distance computations are some of the items included. *Link-Belt Co.*

Metal Stitching 5

"Metal Stitching, A New Idea in Fastening" is a 16 page booklet that gives detailed information on stitching metal to metal or metal to nonmetalic materials and illustrates several applications. *Acme Steel Co.*

Electronic Controls 6

Electronic control equipment for control of resistance welders, automated machine tools, safety equipment and related devices is illustrated in a 12 page bulletin. Also listed are facilities for engineering and research work in electronics. *Robotron Corp.*

Industrial Fittings 7

Wall charts and descriptive engineering literature covers a line of industrial hydraulic fittings for tube, pipe and hose. Fittings range in size from ⅛ to 2 in. and are available in steel, brass, aluminum alloy or stainless steel. *AFCO Fitting Co.*

Material Handling 8

Bulletin MS-57 shows a wide range of wire parts-handling baskets for conveying and processing production parts. Also shown in the eight page bulletin are conveyor hooks, plating racks and many special purpose materials handling items. *Wire & Iron Products, Inc.*

Thermostat Metals 9

Four page bulletin TRU-6 entitled "Corrosion-Resistant Thermostat Metals" shows the test results on various thermostat metals exposed to corrosive environments such as salt spray, hot water and highly humid atmospheres. *General Plate Div. of Metals & Controls Corp.*

(Please turn page)

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Conversion Assemblies 10

Modernization and conversion assemblies for older, obsolete or worn out straight side gap frame presses are shown in a 16 page bulletin of the *E. W. Bliss Co.*

Separators 11

Bulletin S 574-1 lists 30 in. SWECO vibrating screen separators which are used in screening all types of dry materials and to separate solids from liquids. *Southwestern Engineering Co.*

Press Welders 12

Precision spot and projection press welders are listed in Bulletin P-101, six pages. *The Precision Welder and Flexopress Corp.*

Collector Rings 13

Custom-built collector rings, both the cylindrical and annular style, are shown in Bulletin 83. *The B. A. Wesche Electric Co.*

Controls 14

Form VS-51 offers condensed information on solenoid valves and electromagnetic controls produced by *Automatic Switch Co.*

Transmssion 15

Bulletin 1399, four pages, describes the Baker Duo-Torque transmission which combines features of the torque converter and fluid coupling with a power shifted two-speed transmission. *The Baker-Raulang Co.*

USE THIS POSTCARD

Heat Treating Units 16

Design and construction features of Ispen Model B heat treating units are contained in a three page brochure. Features include alloyed ceramic heating tubes, single-piece cast fan and shaft and automatic and semi-automatic mechanical loaders and unloaders. *Ispen Industries, Inc.*

Hand Screw Machine 17

A six page fold-out bulletin describes a hand screw machine that features a bed turret with six stations. The bulletin also explains how a standard 11-in. metal lathe may be converted into a hand screw machine. *Delta Power Tool Div., Rockwell Mfg. Co.*

Grinding Wheels 18

A wide range of vitrified and resinoid grinding wheels in standard or specified sizes is listed in a 16 page bulletin. A breakdown showing the abrasive, bond and specification marking for different types of metals and classes of work to be ground is included. *Simonds-Worden-White Co.*

Squarehead Cylinders 19

Catalog 157-S, 30 pages, gives specifications and ordering data for a line of squarehead cylinders. The line is rated for 2000 psi working pressures, up to 3000 psi in nonshock service. *Anker-Holth Div. of Wellman Engineering Co.*

Aluminum Sheet 20

Properties, applications, specifications and related data of aluminum sheet are detailed in a 28 page publication prepared by *Revere Copper and Brass Inc.*

Facilities 21

Four-page bulletin, "From Idea to Production" lists the mechanical, electronic and hydraulic engineering and manufacturing facilities at *The Con-Ray Corp.*

Polyester Resin 22

Dulux foam resin R-42, a polyester resin for heat insulation and sound proofing purposes is described in a technical bulletin published by *E. I. DuPont De Nemours & Co.*

American Standard 23

B5.35, a standard entitled "Machine Mounting Specifications for Abrasive Discs and Plate Mounted Wheels," includes material on the location and size of bolt holes in steel disc wheels, the mounting side of abrasive discs and plate mounted wheels and related subjects. *Grinding Wheel Institute.*

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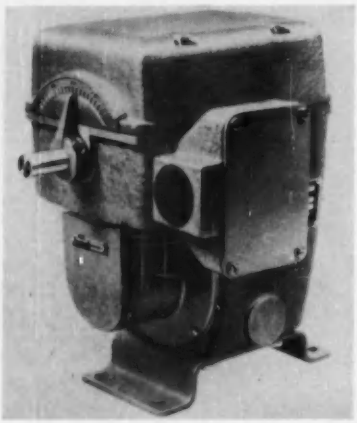
NEW PRODUCTS AUTOMOTIVE-AVIATION

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

Electric Valve Motor

Valves, dampers and other controlled devices can be operated by an electric motor in accordance with signals generated by electric control



instruments. Two models, each having two position, floating or proportional control forms, are available in various speeds and torques. Series 831E2 has a rated output torque ranging from 1.5 to 31.2 lb-ft. Series 831E1 torque rating ranges from 3.1 to 62.5 lb-ft. Stall torques for both series are a minimum of twice the rated torques.

The motor is said to accurately position final control elements over full drive shaft rotation. The two position and floating control models can be adjusted for 35 to 335 deg rotation, and the proportional model for 35 to 100 deg rotation without loss of reversing rotation. Voltage and frequency of the motor is 115 or 230 v, 50 or 60 cycles, or 115 v 25 cycles. *Minneapolis - Honeywell Regulator Co.*

Circle 71 on postcard for more data

Precision Potentiometer

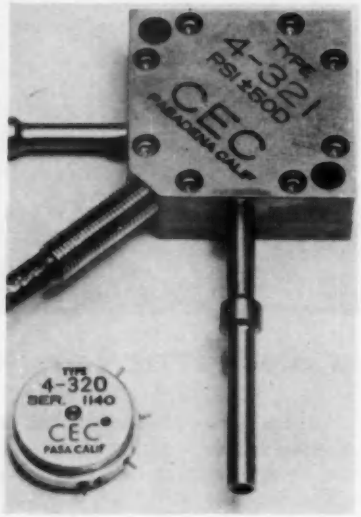
The 300 Series potentiometer is a high linearity, precision potentiometer which is available with a servo bushing or threaded hole mounting. The unit, which has an all anodized aluminum housing, can be obtained with an independent linearity of 0.1 per cent and with a total resistance up to 100K ohms. Non-linear windings are also available.

Each section has been ganged by a stainless steel clamp ring, allowing a moisture seal to be inserted between, yet permitting easy phasing of individual sections. They are provided with low torque sleeve type bearings. Ball bearings are available on request. Torque can be reduced to 0.5 oz.-in. per section. Up to nine sections can be mounted on a common shaft. *Maurey Instrument Corp.*

Circle 72 on postcard for more data

Pressure Pickup

A small pressure pickup known as Type 4-320 Miniature Pressure Pickup is ½ in. in diam and less than ¼ in. thick. Suitable for airborne applications, the device is capable of withstanding 200 G's without damage. Differential and gage pressure ranges

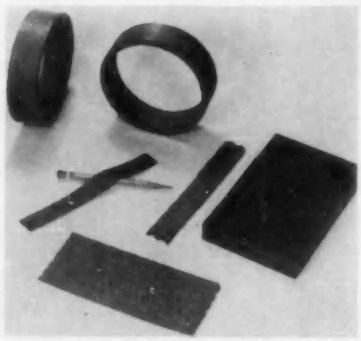


from ±7.5 to ±50 psid and 25 or 50 psig are available for operation at line pressures up to 300 psi. *Consolidated Electrodynamics Corp.*

Circle 62 on postcard for more data

Hard-Facing Method

Kenplate, for hard-surfacing parts, consists of small hexagonal plates of cemented tungsten carbide assembled in a continuous pattern on an adhesive glass fiber backing to provide flexible sheets or strips for application on flat or curved surfaces. The



backing holds the plates in place while they are being bonded by epoxy adhesives, silver solder or conventional brazing materials.

Two sizes of hexagons are now being made (each in three thicknesses). After being applied, joint spacing is said to be less than 0.002 or 0.003 in. Kenplate is supplied in strips 6 and 12 in. long. Applications include wear plates for mills, liners for ball mills, machine tool ways and mold liners for abrasive materials. *Kennametal, Inc.*

Circle 63 on postcard for more data

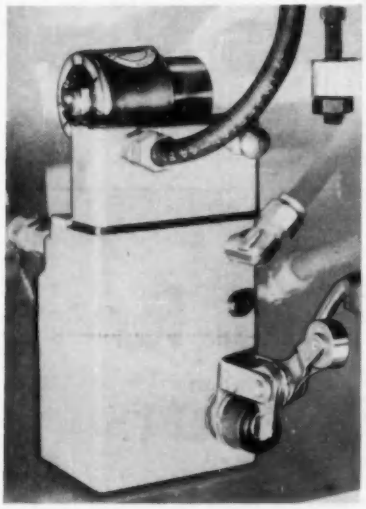
Static Seals

Static seals with full metal to metal contact suitable for sealing in a wide range of fluids from vacuum to more than 5000 psi and temperatures ranging from —80 to 500 F have many applications in the military, aircraft and missile fields. The gaskets are available in AN 763 flange patterns or in special patterns as desired. In addition to usage as static seals between flanges they may also be designed for use as orifices, cover plates and spacers. *Still-Seal Gasket Dept., Stillman Rubber Co.*

Circle 64 on postcard for more data

Control Valve

A four-way slide valve, able to actuate a variety of air powered mechanisms and equipment, is designed with an interlock switch and manual set up control. Named the



Control-Pac, it can be used to obtain reciprocating action of double-acting cylinders with either long or short stroke. It can control more than one mechanism and typical applications include controlling parts escapement and positioning action in high output assembly operations.

Designed for mounting on or adjacent to a power head, the Control-Pac includes a pilot-operated slide valve, a remote return control throttling valve, an electrical junction box with provision for an air silencer and either electric or pneumatic initiation. Outside dimensions are 3 by 2 by 6⅞ in. high, including solenoid pilot valve. All electrical circuits are according to JIC standards, 110 v. *Dixon Automatic Tool, Inc.*

Circle 65 on postcard for more data

Pressure Control

Pressure control in hazardous locations can be obtained by use of an explosion-proof device designated Type H95, which was designed for use where explosive vapors or gases are present. H95 pressure settings are made with an external adjustment knob and a calibrated dial. Models are available with adjustable range spans between 0 and 500 psi, and maximum pressures up to 600 psi. Switch differentials in the new models range from 1.5 ±½ in. Hg to 7 ±3 psi. These may be increased or decreased according to requirements.

Any one of three types of standard snap-action switches can be used with the controls: Class R, normally closed circuit, opens on rising pressures; Class G, normally open circuit, closes on rising pressures; Class B, double throw with no neutral position. All switch classes are suitable for 180 F ambient temperatures and are rated at 15 amp at 115 or 230 v ac. *United Electric Controls Co.*

Circle 66 on postcard for more data

Pilot Check Valves

Pilot check valves for hydraulic installations have provisions for emergency manual release. Normally used for hydraulic cylinders performing lifting or clamping operations, the valve locks the cylinder in position preventing pressure loss due to leakage or line rupture. The valves are of the spring-loaded ball type, and the manual release consists of a screw which depresses the ball check, permitting hydraulic oil to release the valve.

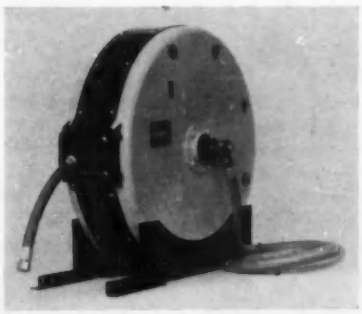
Port connections are available to accommodate ¼, ⅜ and ½ in. pipe sizes. Oil pressures up to 3000 psi can be handled by the valves, which come in both single and double models. *Fluid Controls, Inc.*

Circle 67 on postcard for more data

Industrial Reel

Model A-2, the latest addition to a line of industrial hose and cable reels, has a capacity of 50 ft of ½ in. ID single hose. Designed for handling compressed air, industrial gases, liquids and chemicals, the unit features the universal type mounting bracket.

Heavy duty clock-type spring provides automatic retraction when the hose is not in use. Teflon seals are



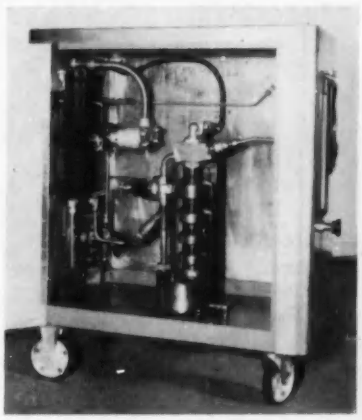
provided for leak proof operation at all normal operating pressures. The hose is locked in any desired length by position action pawl and is released by a slight tug on the hose. *United Specialties, Inc.*

Circle 68 on postcard for more data

Stainless Fuel Burette

A fuel burette of stainless steel construction is said to eliminate fire hazards caused by glass breakage in fuel metering devices; air valving or explosion-proof solenoids provide further protection. The design produces continual upward flow to the engine and is applicable to gasoline, kerosene, fuel oil and similar combustion engine fuels.

Two standard models are available, each with automatic timing and four manually selectable volumes: 600 cc



capacity, for 75, 150, 300 and 600 cc; 1000 cc capacity, for 150, 300, 600 and 1000 cc. Both are available in a remotely controlled panel or in a mobile console. The mobile unit features quick disconnect fittings, remote shutoff valve, fuel conditioner and pressure regulator. *Performance Measurements Co.*

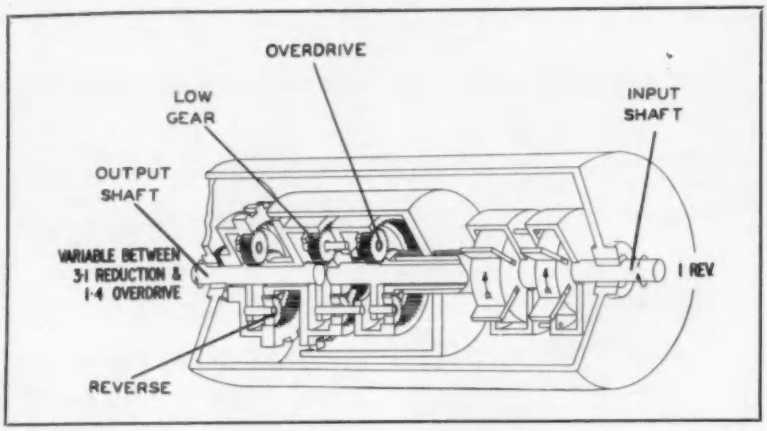
Circle 69 on postcard for more data

Hot-Melt Adhesive

Hot-melt adhesive, Ray-Bond R-84001, provides instant grab when applied to glass, etched Teflon, Mylar, polystyrene and many other materials. It is applicable in holding parts in place until they can be permanently fastened. A one sq in. lap joint made from strips of Mylar will hold a dead load of 50 lb at 73 F and a load of 6 lb at 150 F.

Composed of solids, the adhesive is supplied in a semi-brittle state. It is liquefied by heating to 250 F, and is applied in the fluid state to one of the parts being assembled. The other part is pressed into contact and the two parts held together until the adhesive cools. *Raybestos-Manhattan, Inc.*

Circle 70 on postcard for more data



At right is shown schematic illustration of the experimental transmission

By David Scott

British Automatic Transmission for Low Powered Cars

THE Motor Industry Research Association, in England, recently demonstrated an experimental automatic transmission for low-powered cars that combines hydraulic and mechanical torque transmission in a shunt arrangement. It provides infinitely variable ratios between a low of 3 to 1 and an overdrive of 0.7 to 1, and is claimed to have low losses since only part of the total drive is transmitted hydraulically.

Apart from the separate reverse gear, the unit consists of two epicyclic gear trains for the overdrive and low ratios that are locked by an individual vane-type pump and motor carried on the input shaft. These variable-delivery units are interconnected in a closed circuit so that when one is at a maximum displacement the other has zero fluid delivery. A small control valve, regulated by road speed and throttle position, determines the selection of these two limits and all intermediary relationships between them. It thus varies the power flow in each path, and changes the overall ratio in the combined hydromechanical drive.

The pump is connected by hollow shaft to the sun wheel of the front (overdrive) gear train, and the motor to the annulus of the rear (low gear) set. Locking or retarding the rotation of one of the trains is determined by the relative displacement of the hydraulic units. Transmission efficiency increases as the extreme ratios are approached, and reaches maximum in full overdrive and low gear when the coupling is entirely mechanical and involves no oil circulation. Reverse is obtained by a third epicyclic train that is engaged by a dog clutch. Releasing the pressure in the closed hydraulic circuit provides an effective neutral.

• • •

AMA Publishes 37th Edition Of Automotive Statistics

U. S. industries other than the motor vehicle industry produce $5 to 6 billion worth of automotive products yearly, according to the Automobile Manufacturers Association.

This represents, the AMA says, an estimated factory employment of 330,000 or more. Adding this figure to the 790,000 employed in motor vehicle, parts, body, and trailer manufacture, puts total automotive production employment above the 1.1 million mark.

The AMA report was released in the 37th edition of the annual statistical handbook, "Automobile Facts and Figures."

Among information highlights of the booklet are the following:

Motor vehicle registrations in the U. S. this year will reach an all-time high estimated at 67,231,000, up about two million from the 1956 record.

The number of licensed drivers in the combined hydromechanical 869,000.

Special taxes on motor vehicle users reached a peak of $8 billion in 1956.

Taxes make up one-fourth of the delivered price of a passenger car today.

World's Top Cars to Be Shown In N. Y. Coliseum April 5-13

The world's six leading automobile producing nations will present their newest models at the 1958 International Automobile Show to be held in N. Y. Coliseum from Apr. 5-13.

Charles Snitow, president of the show, said that the 1958 version would be twice as large as the show held in the Coliseum two years ago. The combined displays from England, France, Germany, Italy, Sweden, and the U. S., he said, will take up over 200,000 sq ft of exhibition space as against 88,000 sq ft in 1956.

Now used by two million-car-a-year manufacturers

Sealed Power's NEW STAINLESS STEEL OIL RING

U. S. Patent
No. 2,789,872

6

advantages carbon steel rings don't have

- holds full tension at engine operating temperature
- highly resistant to corrosion
- won't sludge
- side-sealing because of axial pressure of expander
- conforms independently of ring groove depth
- high radial pressure against cylinder wall assures maximum oil control

Chrome-plated steel side rails for more than double normal ring life

Let our engineers give you full details—including exceptional performance data in cars of one of America's largest builders

SEALED POWER CORPORATION • MUSKEGON, MICHIGAN • ST. JOHNS, MICHIGAN • ROCHESTER, INDIANA • STRATFORD, ONTARIO

DETROIT OFFICE • 7-236 GENERAL MOTORS BUILDING • PHONE TRINITY 1-3440

Sealed Power Piston Rings

PISTONS • CYLINDER SLEEVES

Leading Manufacturer of Automotive and Industrial Piston Rings Since 1911

Largest Producers of Sealing Rings for Automatic Transmissions and Power Steering Units

The BUSINESS PULSE

Most Businessmen Are Adopting a "Wait-and-See" Attitude Toward Effect of Reduction in Discount Rates by Federal Reserve Banks. Influence of More Defense Spending Will Depend on its Magnitude and the Financing Methods

The reduction in discount rates by Federal Reserve banks constitutes a logical adaptation of monetary policy to the slackening business tempo. It nevertheless came as a surprise to many people, because officials had been talking in an opposite vein right up to the time the change was instituted. The statement of Chairman Martin of the Board of Governors in particular had indicated that inflation was still the paramount concern of monetary authorities, and this impression was buttressed by weekly banking statistics, which disclosed no letup in credit restraint prior to the cut in discount rates.

There is no way of knowing for certain what specific factors prompted the rather sudden shift in Federal Reserve policy, since officials do not offer formal explanations when they take action. It seems reasonable to infer, however, that decidedly poor business reports with respect to operations during October were of crucial significance in determining the decision.

Downward Tendencies

A decline of two points in the Federal Reserve Board's seasonally adjusted index of industrial production must have been of key importance. The index dropped to 142 per cent of its 1947-49 average, which put it four points below its level a year earlier and five points below its all-time peak, attained last December. Continuing weakness in durable goods, including a contraseasonal decline in steelmill operations, was the distinguishing feature of the month's experience, with the output of minerals also extending its downward tendency.

This Survey Is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

The October reading for durable-goods production was seven per cent below that at the end of 1956—clearly a significant setback. And there is little ground for the assumption that the decline has reached its low, in view of the fact that the flow of new orders to manufacturers appears to be in a continuing downtrend. It is therefore understandable that Federal Reserve officials should have grown more receptive to the idea of easing the money situation, particularly since evidence has been multiplying which indicates that employment conditions were being increasingly affected during October by the lag in output. Factory employment dropped 470,000 below that in October, 1956, while the length of the work week slipped further to show a year-to-year loss of 1.2 hours.

On top of this decline in manufacturing activity, Federal Reserve officials were confronted with the record of reduced levels of both personal income and retail sales during October. Each of these fell for the second month in succession, after having moved upward for a long time previously. In the case of personal income, it was the first two-month decline since early 1954, when an economic downturn was in progress. It is especially noteworthy that cyclical turning points in personal income and also in retail sales in the past have tended to lag behind turning points in aggregate business activity, and knowledge of this fact may have caused Federal Reserve officials to interpret October experience as providing definite confirmation that the economy had entered a phase of recession.

Officials no doubt were also impressed by such things as the persistent pattern of contraseasonal decline in bank loans during October, the dramatic shortfall below 1956 levels in freight carloadings, and the developing price softness for many sensitive commodities. In combination, these developments pointed strongly to recession, so that Federal Reserve action was understandable, even though the reversal of policy was somewhat abrupt.

Once the decision to modify its credit policy was made, several alternative approaches were open to the Federal Reserve, and the significance of choosing a reduction in the rediscount rate should not be overlooked. The choice reflects an apparent desire to have the public realize promptly and unambiguously that credit restraint is to be relaxed. By itself, purchases of Treasury bills in the open market would not have achieved this end as well, since a period of time must elapse before Federal Reserve intentions become clear. Notice of a change would not have been served as promptly or as effectively. Thus, the decision to reduce discount rates indicates a belief on the part of officials that businessmen needed rather quick reassurance that monetary restraint would not be overdone. (*Continued, page* 138)

Now you can get standard sizes in C/R End Face Seals!

Chicago Rawhide now announces the availability of a complete new line of Standard End Face Seals to meet the widest possible range of sealing requirements. For sizes or conditions beyond the range of Standard End Face Seals, C/R engineers will continue to cooperate with you on special designs. Their experience in sealing applications is unmatched — your assurance of getting the correct seal for the job.

Write for your free copy of this new C/R Bulletin ⟶

Bulletin EF-100 includes complete envelope space data on C/R Standard End Face Seals and mating rings to help you select the correct size for your equipment design:

- Size range table in two series — long and short — from ¾ to 4 inch shaft diameter.
- Size range table on mating rings.
- Typical seal installations for internal and external pressure.
- Special instructions on how to order.

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Offices in 55 principal cities. See your telephone book.

In Canada: Manufactured and Distributed by Chicago Rawhide Mfg. Co. of Canada, Ltd., Hamilton, Ontario.

Export Sales: Geon International Corp., Great Neck, New York

C/R PRODUCTS: C/R Shaft and End Face Seals • Sirvene (synthetic rubber) molded pliable parts • Sirvis-Conpor mechanical leather cups, packings, boots • C/R Non-Metallic Gears

AIR BRIEFS

By RALPH H. McCLARREN

Bonded Assemblies For Convair 880 Jet

Convair Division of the General Dynamics Corp. has completed steel work on fixtures for bonding wings of the Convair 880. Each fixture has an overall length of 90 ft, a maximum width of 10 ft. Use of the fixtures will be made in the application of Scotchweld, a bonding process developed jointly by Convair and the Minnesota Mining and Manufacturing Co.

This process was first used on the Convair supersonic all-weather jet intercepter, the F-102A. Strips of dried Scotchweld tape will be placed between the wing skins and structural members.

The pre-curing oven for use in bonding will be heated electrically and is 80 by 20 by 10 ft in size.

1958 Beechcrafts

Beech Aircraft Corp. has announced its new and improved 1958 aircraft. Included in the group are the latest model Bonanza, the new Beechcraft Travel Air Business Plane, a new version of the Twin-Bonanza and the Super 18 Transport.

The 1958 J35 Bonanza features more speed, power and comfort and is equipped with a new six cylinder Continental 10-470-C engine rated at 250 hp at 2600 rpm for all operations.

The engine features continuous flow fuel injection. Powered with the new engine, the Beechcraft has a high speed of 210 mph; a cruising speed of 200 mph at 75 per cent throttle, and a service ceiling of 21,300 ft.

Beechcraft's new Travel Air Business Plane is a twin-engine, four-place craft, powered by two 180 hp Lycoming 0-360-A1A engines. It has a maximum speed of 208 mph and a cruising speed of 200 mph. Service ceiling is 19,300 ft. This plane was produced to fill in a price gap between the Bonanza and the six-place Twin-Bonanza.

High compression 295 hp Lycoming G0-480-G2D6 engines are used to power Beechcraft's new D50A Twin-Bonanza. The supercharged engines provide a high speed of 214 mph and cruising speed of 203 mph. The model F50 version is powered by two 340 hp engines, providing a maximum speed of 240 mph and a cruising speed of 228 mph.

The largest and most luxurious airplane in the Beechcraft line is the Beechcraft Super 18 executive transport for 1958. This is an eight-place airplane, powered by two 450 hp Pratt & Whitney R-985 engines. Equipped with many new improvements in design and interior arrangement, the Super 18 has a range of 1626 miles with 45 minutes fuel reserve. Its top speed is 234 mph and cruising speed is 215 mph.

Jet Airliner

The first Boeing 707 commercial jet airliner was rolled out from its factory on October 28, and will be scheduled to make its first flight by the end of the year. The 707 prototype has been flying for over two years. First production of this type was the KC-135 tanker jet for the USAF. The KC-135 recently established a record for non-stop flight to and from Buenos Aires, South America. Return flight of 5200 miles from Buenos Aires to Washington, D. C. was made non-stop in 11 hours, five minutes. The plane was piloted by General Curtis LeMay. This flight is a good indicator of what one can expect of commercial jet transports when they will be on regular services by the airlines.

Centrifugal Missile Tester

A huge centrifuge has been installed at the Convair-Astronautics plant in San Diego, Calif. The centrifuge is to be used to test intercontinental ballistic missile components by subjecting them to extremes of stress, vibration and temperature.

Equipment for the centrifuge was designed and built by the Rucker Co. of Oakland, Calif. to specifications established by Convair Division of General Dynamics Corp.

It is designed to whirl objects weighing up to 2000 lb at 121 rpm at the end of a 20-ft boom.

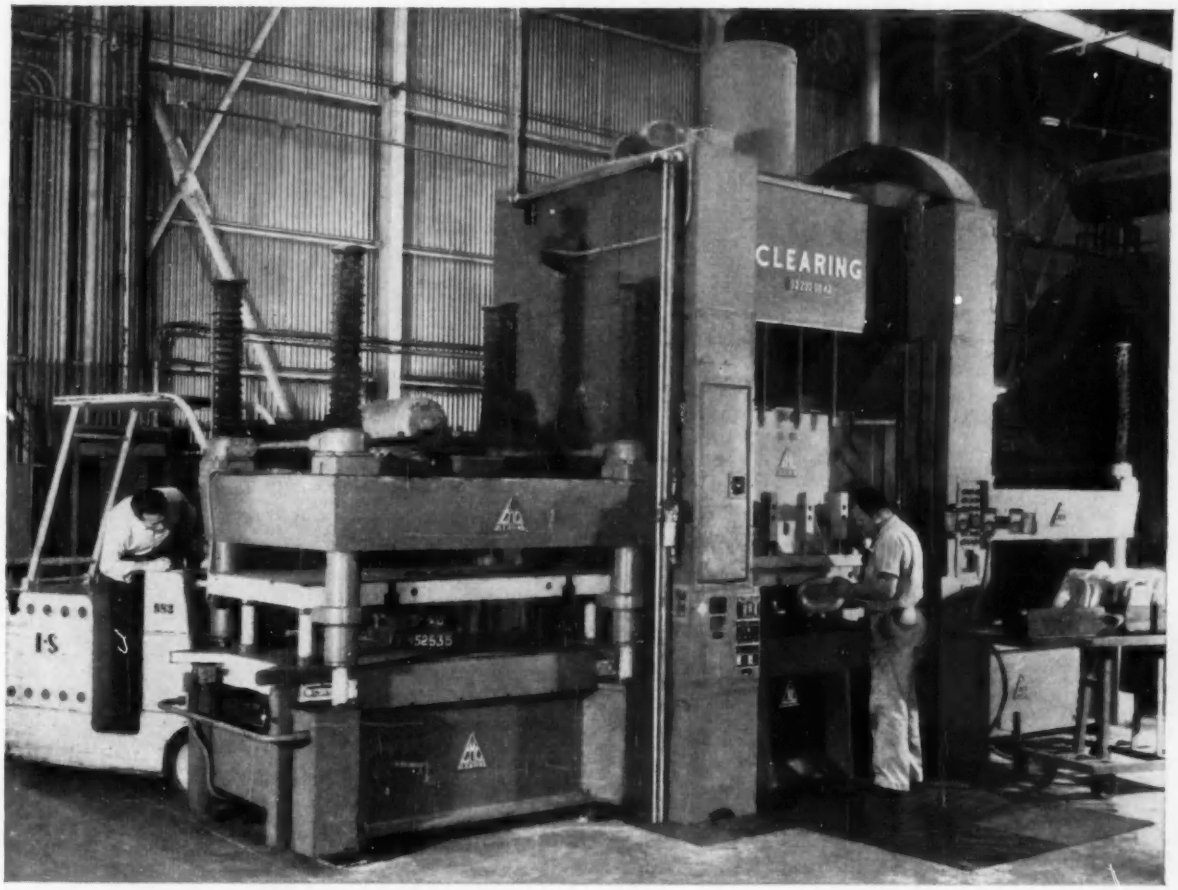
At full speed, the units under test are traveling about 170 miles per hour and are subjected to a force equal to 100 times the pull of gravity.

Power for the centrifuge is furnished by three hydraulic motors of 120 hp each.

The motors have a combined capacity for 125 gpm under a pressure of 5000 psi. Three electric motors developing a total of 400 hp drive hydraulic pumps to furnish the fluid pressure and flow.

In one of the first tests, the centrifuge accelerated to 104 rpm in 143 seconds. It was stopped in 78

(*Turn to page* 140, *please*)



How North American Aviation plans continuous production of short runs with a CLEARING MOVING BOLSTER Press

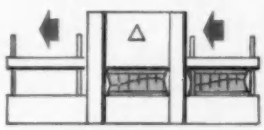
As you know, the aircraft industry needs a lot of short run stampings, and short runs can plague a production man because a lot of valuable time is eaten up in die setting. But here's the way Clearing has helped North American Aviation, Inc. lick that problem. The press above has a double bolster that can be automatically powered across the die area.

While one job is running, the next job is being set up *outside* the press. When you finish this production run, push a button and the dies are unclamped from the press slide. Another push button rolls the new dies into place under the slide. Clamp these in and start running. Now you can set the next job up on the other side of the press.

The device at right is another added feature. It's a die separator that makes it possible to open the dies for maintenance and inspection without tying up crane facilities.

Clearing moving bolster presses can be the answer for your company if you want to put more productive hours in a day. We have a folder prepared on "Push Button Die Setting." It's yours for the asking.

how it works



Dies are set up outside the press. When the current job is completed the bolster is traversed automatically to the right or left. Now the dies are in place for the next job. Slide clamps which hold the die to the slide are also engaged and disengaged automatically.

CLEARING PRESSES THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION *division of* **U. S. INDUSTRIES, INC.**

6499 W. 65th STREET, CHICAGO 38, ILLINOIS • HAMILTON DIVISION, HAMILTON, OHIO

• • INDUSTRY STATISTICS • •

1957 WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Make	Weeks Ending Nov. 30	Weeks Ending Nov. 23	Year to Date 1957	Year to Date 1956
PASSENGER CAR PRODUCTION				
Hudson			1,345	6,723
Nash			3,561	16,392
Rambler	2,697	3,238	95,151	71,078
Total—American Motors	2,697	3,238	100,057	94,193
Chrysler	1,345	2,268	111,173	94,039
De Soto	527	2,098	111,854	90,763
Dodge	4,079	5,930	276,026	178,642
Imperial	431	714	35,654	
Plymouth	9,479	12,499	613,007	400,077
Total—Chrysler Corp.	15,861	23,509	1,147,714	763,521
Edsel	359	476	52,469	
Ford	23,549	37,587	1,395,949	1,223,374
Lincoln and Continental	674	802	34,300	44,388
Mercury	3,508	5,400	256,654	219,166
Total—Ford Motor Company	28,090	44,265	1,739,372	1,486,928
Buick	8,884	11,052	365,689	481,118
Cadillac	3,332	3,975	140,445	125,392
Chevrolet	39,227	44,807	1,360,687	1,484,551
Oldsmobile	9,038	10,202	350,029	392,090
Pontiac	7,589	9,259	308,267	305,578
Total—General Motors Corp.	67,070	79,295	2,525,117	2,788,729
Packard	83	57	4,861	13,289
Studebaker	1,130	1,494	63,032	74,889
Total—Studebaker-Packard Corp.	1,213	1,551	67,893	88,178
Checker Cab	52	79	3,715	3,643
Total—Passenger Cars	114,883	151,937	5,583,888	5,225,192
* Included with Chrysler.				
TRUCK AND BUS PRODUCTION				
Chevrolet	6,767	6,822	322,945	325,053
G. M. C.	1,476	1,771	63,578	84,944
Diamond T	123	143	5,300	4,786
Divco	48	60	2,607	3,289
Dodge and Fargo	1,061	1,569	71,491	83,733
Ford	4,532	6,197	312,534	279,725
F. W. D.	3	15	977	1,559
International	2,249	2,556	111,079	125,233
Mack	302	341	15,878	16,788
Studebaker	120	189	8,787	13,888
White	183	335	17,411	19,813
Willys	349	2,208	69,084	58,456
Other Trucks	65	70	3,860	6,001
Total—Trucks	17,298	24,276	1,005,531	1,023,268
Buses	50	55	3,624	3,901
Total—Motor Vehicles	132,241	176,268	6,593,023	6,252,361

1957 TRUCK TRAILER SHIPMENTS

Type of Trailer	September	Nine Months 1957	Nine Months 1956
Vans			
Insulated and refrigerated	366	3,632	4,297
Steel	41	499	927
Aluminum	325	3,133	3,370
Semi-insulated	56	464	N.A.
Steel	56	464	N.A.
Aluminum			N.A.
Furniture	75	1,278	1,660
Steel	75	1,278	1,660
Aluminum			
All other closed-top	1,834	15,631	20,088
Steel	717	7,168	8,519
Aluminum	1,117	8,463	11,569
Open-top	292	2,440	2,884
Steel	170	1,249	1,275
Aluminum	122	1,191	1,609
Total—Vans	2,623	23,445	28,929
Tanks			
Petroleum	289	3,388	4,086
All other	119	1,125	761
Total—Tanks	408	4,513	4,847
Pole, pipe and logging			
Single axle	35	307	483
Tandem axle	42	500	1,131
Total	77	807	1,614
Platforms			
Racks, livestock and stake	195	1,842	746
Grain bodies	74	1,048	1,245
Flats, all types	404	5,211	6,706
Total—Platform	673	8,101	8,697
Low-bed heavy haulers	158	2,308	2,463
Dump trailers	141	1,809	1,663
All other trailers	257	2,703	2,090
Total—Complete Trailers	4,337	43,486	50,303
Chassis	483	3,383	2,943
Total—Trailers and Chassis	4,820	46,869	53,246

N.A.: Not Available. Source: Industry Div., Bureau of the Census.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	September 1957	August 1957	September 1956	Nine Months 1957	Nine Months 1956	Per Cent Change: Sept. over August	Sept. over Sept. 1956	Nine Months 1957 over 1956
1	New England	26,904	26,958	22,807	247,760	263,267	— .20	+17.96	— 5.89
2	Middle Atlantic	91,991	95,054	77,936	887,976	879,418	— 3.22	+18.03	+ .97
3	South Atlantic	64,888	61,960	55,647	587,067	601,861	+ 4.73	+16.61	— 2.46
4	East North Central	119,955	115,662	98,535	1,134,660	1,125,069	+ 3.71	+21.74	+ .85
5	East South Central	22,510	24,847	19,238	220,736	226,576	— 9.41	+17.01	— 2.58
6	West North Central	44,438	46,455	38,214	402,729	400,603	— 4.34	+16.29	+ .53
7	West South Central	45,620	48,244	42,489	429,503	423,282	— 5.44	+ 7.37	+ 1.47
8	Mountain	17,107	18,277	16,050	154,382	153,692	— 6.40	+ 6.58	+ .45
9	Pacific	61,804	54,382	50,105	536,382	539,057	+13.65	+23.35	— .50
	Total—United States	495,217	491,839	421,021	4,601,195	4,612,825	+ .69	+17.62	— .25

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt. Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va. Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn. Zone 6—Iowa, Kan., Minn., Mo., Neb., N. D., S. D. Zone 7—Ark., La., Okla., Tex. Zone 8—Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo. Zone 9—Cal., Ore., Wash.

1957 TRUCK FACTORY SALES BY G.V.W.

As reported by the Automobile Manufacturers Association

Period	6,000 lb.* and less	6,000-10,000 lb.	10,001-14,000 lb.	14,001-16,000 lb.	16,001-19,500 lb.	19,501-26,000 lb.	26,001-33,000 lb.	Over 33,000 lb.	Total
First Quarter	139,575	38,996	9,157	39,434	16,509	11,533	10,298	9,085	274,587
Second Quarter	137,091	45,692	11,961	51,060	22,489	13,032	9,953	10,530	201,808
Total—Six Months	276,666	84,688	21,118	90,494	38,998	24,565	20,251	19,615	576,395
Third Quarter	117,541	34,867	8,017	35,532	19,507	13,882	9,619	7,196	246,161
Total—Nine Months	394,207	119,555	29,135	126,026	58,505	38,447	29,870	26,811	822,556
October	45,053	12,568	3,028	12,971	5,582	3,673	2,802	2,342	88,019
Total—Ten Months 1957	439,260	132,123	32,163	138,997	64,087	42,120	32,672	29,153	910,575
Total—Ten Months 1956	366,596	170,568	34,476	168,792	69,090	48,413	69,321	**	927,256

* Prior to January 1, 1957, vehicles below 10,001 lbs., G.V.W. were grouped "5,000# & less" and "5,001-10,000 lb." ** Included with 26,001-33,000 lb. group.

More Government Contract Awards

LATEST contracts awarded by various Government agencies, and covering primarily automotive and aviation products, are listed in the following. Typical of the items contained in these monthly listings are: passenger cars, motor trucks, aircraft, military tanks, engines, transmissions, other components, spare parts, etc. This list is for the period Oct. 31 to Nov. 27, inclusive.

AEROJET - GENERAL CORP., Azusa, Calif.
Rocket, Aerobee-Hi sounding model AJ11-21-5 ea.; rocket booster, model X103C10—15 ea.; assembly, nose extension, No. 32731—20 ea.—$293,211

AIRCRAFT PRODUCTS CO., Bridgeport, Pa.
Valve assy. parking brake main wheel, applicable to H34-A aircraft—$33,954

AIRPONENTS, INC., Lawrence, Long Island, N. Y.
Commercial repair of aircraft access.—Negotiated contract—$100,000

AMERICAN MOTORS CORP., Detroit, Mich.
Automobiles—36 ea.—$56,082

THE ARMSTRONG RUBBER CO., West Haven, Conn.
Tire, 9.00 x 20, 10 PR, T&B, M&S, ND—1342 ea.—$46,795

THE BABB CO., INC., Linden, N. J.
Commercial repair of aircraft access.—Negotiated contract—$100,000

BELL HELICOPTER CORP., Fort Worth, Texas
Study of helicopter icing problems—$171,200
HU-1 helicopters, spare parts, ground support equipment, testing and data—$2,193,180

BENDIX AVIATION CORP., South Bend, Ind.
Wheel assy. main (49x17) for B-66B aircraft; brake assy. main for B-66B aircraft—$119,514

BOEING AIRPLANE CO., Seattle, Wash.
Procure long lead-time materials, supplies and contractor-furnished equipment (both contractor-fabricated and vendor produced) and preliminary engineering required for the manufacture of KC-135A tanker aircraft—$10,000,000

CAMPBELL CHAIN CO., York, Pa.
Vehicular equipment components — indefinite quantity

CANADIAN COMMERCIAL CORP., Washington, D. C.
DHC-4 airplanes—$2,087,000
Overhaul of Gov't-owned Army aircraft engines, used on UIA Army aircraft—29 ea.—$48,345

CENTRAL AVIATION & MARINE CORP., Sayville, Long Island, N. Y.
Commercial repair of aircraft access.—Negotiated contract—$175,000

CHRYSLER MOTOR CORP., Washington, D. C.
Trucks—20 ea.—$55,581

CINCINNATI TESTING AND RESEARCH LABORATORIES, Cincinnati, Ohio
Plastic compressor blades for jet engine turbine wheels and test reports—$50,246

CONTINENTAL MOTORS CORP., Muskegon, Mich.
Replenishment spare parts—6012 ea.—$128,678
Spares—$52,667
Engines—$331,682
Kits, modification AOS 895-5, engine and concurrent spare parts—$463,904

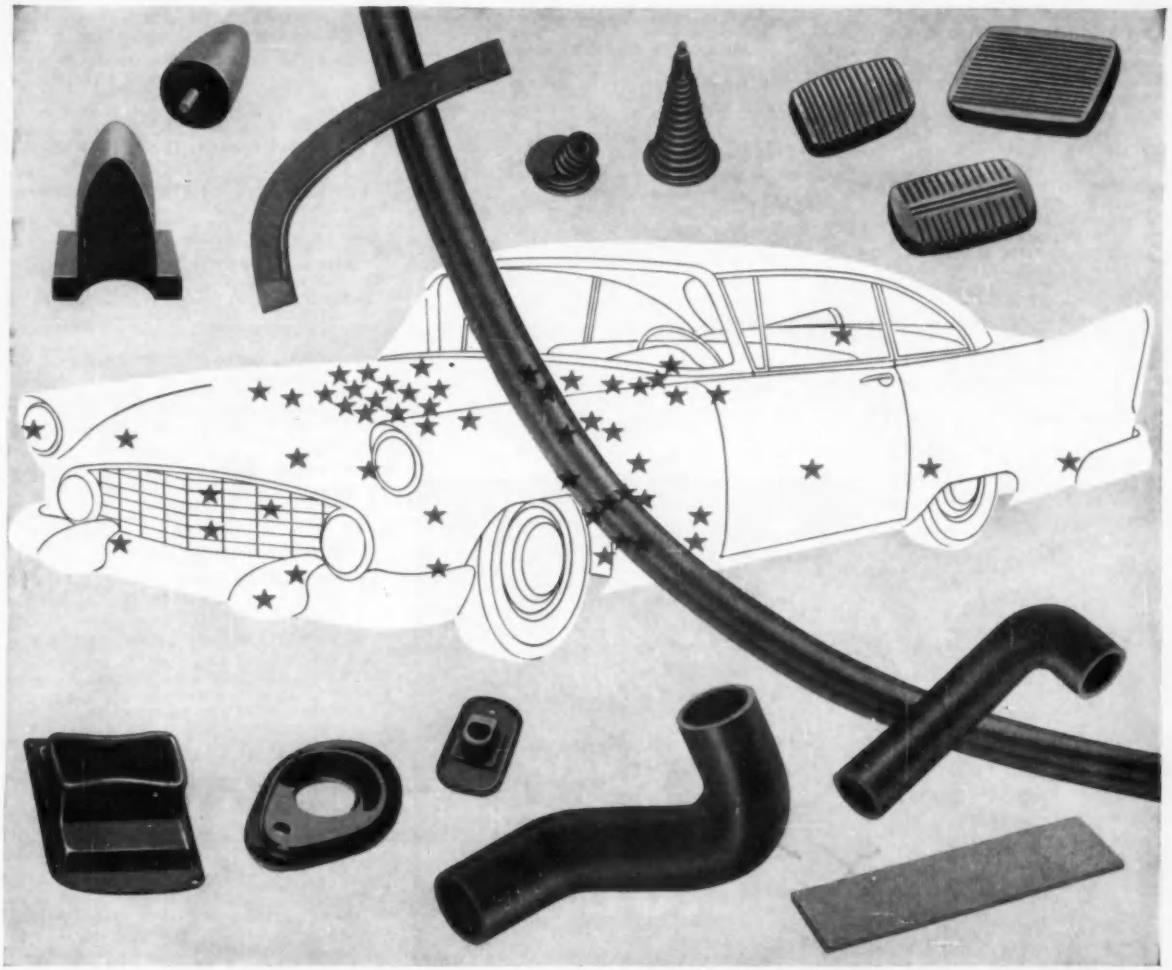
CONTINENTAL MOTORS CORP., Automotive Div., Muskegon, Mich.
Spares—$75,008

COOPER TIRE & RUBBER CO., Findlay, Ohio
Tube, 9.00 x 20, 6000 ea.; and tube, 6.00 x 16, 7970 ea.—$28,085

CURTISS - WRIGHT CORP., Caldwell, N. J.
Modification kits applicable to propellers—$712,167

DOUGLAS AIRCRAFT CO., Santa Monica, Calif.
Spare parts for Nike System: (1) $41,325; (2) $68,709; repair parts for Nike System: (1) $746,554; (2) $31,735; (3) $31,000
Repair parts for Nike System: (1) $28,332; (2) $26,250; (3) $40,867; (4) $57,428; (5) $40,111; (6) $37,333; (7) $42,357; (8) $27,900
Repair parts for Nike Systems: (1) $51,823; (2) $43,538
Repair parts for Nike System—$206,461
Supplies and services relating to the Honest John Missile—$63,234; repair parts for Nike System—$36,140

(*Turn to page* 104, *please*)



★ some of the more than 100 places where ENJAY BUTYL works, silently and dependably, helping to improve the performance of today's new cars.

ENJAY BUTYL—fabulous all-weather rubber BOOSTS PERFORMANCE IN '58 CARS

Molded into more than 100 parts, this super-durable, all-weather rubber helps provide a steadier, softer, more silent ride under even the most strenuous conditions of stress, weather change, and abrasive action. The dependability of all these parts contributes to the outstanding performance of the modern car.

Readily available in non-staining grades, Enjay Butyl rubber can be compounded into white and light-colored parts that combine beauty with top-notch performance. Low in cost, it out-performs and out-lasts all other rubbers formerly used, and may well be able to *cut costs* and *improve performance* in *your* product. For further information, and for expert technical assistance, contact the Enjay Company.

ENJAY BUTYL

Enjay Butyl is the greatest rubber value in the world . . . the super-durable rubber with *outstanding* resistance to aging • abrasion • tear • chipping • cracking • ozone and corona • chemicals • gases • heat • cold • sunlight • moisture.

ENJAY

Pioneer in Petrochemicals

ENJAY COMPANY, INC., 15 West 51st Street, New York 19, N. Y.

Akron • Boston • Chicago • Detroit • Los Angeles • New Orleans • Tulsa

(*Continued from page* 102)

FAIRBANKS, MORSE & CO., Fairlawn, N. J.
Repair parts for Diesel engines, various—1355 ea.—$35,394

FAIRCHILD ENGINE & AIRPLANE CORP., Fairchild Engine Div., Deer Park, Long Island, N. Y.
J44-R-3 turbojet engines for C123 aircraft and related equipment—$755,981

FAIRCHILD ENGINE AND AIRPLANE CORP., Fairchild Aircraft Div., Hagerstown, Md.
C-123B airplanes—$948,000

FIRESTONE TIRE & RUBBER CO., Los Angeles, Calif.
Spare parts for the Corporal Missile System—$77,505
Corporal handling and launching equipment—$994,123

THE FLYING TIGER LINE, INC., Burbank, Calif.
Modification of C-118A aircraft—$25,509

FORD MOTOR CO., Ford Div., Washington, D. C.
Automobiles—10 ea.—$15,650
Trucks—35 ea.—$60,675
Truck tractors—4 ea.—$16,885

GARRETT CORP. (AiResearch Mfg. Co. of Arizona Division), Phoenix, Ariz.
Spare parts for gas turbine compressors—$4,751,584
Spares—$81,635

GENERAL ELECTRIC CO., Cincinnati, Ohio
Engine test dolly—29 ea.—$28,302

GENERAL ELECTRIC CO., St. Louis, Mo.
Overhaul and/or repair of Government-owned aircraft engines—34 ea.—$390 unit price

GENERAL ELECTRIC CO., Small Aircraft Engine Dept., West Lynn, Mass.
T56-A-7 engines for GEL 105 aircraft, T56-A-1A engines for C-130A aircraft—$8,795,000; A1-T58 engine product improvement for CY1957—$3,545,456

GENERAL MOTORS CORP., Cleveland, Ohio
Repair parts for Diesel engines, various—20,995 ea.—$82,501

GENERAL MOTORS CORP., Detroit, Mich.
Replenishment spare parts—3319 ea.—$271,030
Spares—$29,791

GENERAL MOTORS CORP., Allison Div., Indianapolis, Ind.
Services and supplies to modify and convert GF J33-A-33/33A engines to J33-A-41 engines (for TM 61B missile)—$495,600

GENERAL MOTORS CORP., Chevrolet Motors Div., Detroit, Mich.
Trucks—101 ea.—$169,412
Truck, dump, 2½ ton, 4x2—8 ea.—$33,146
Automobiles—15 ea.—$22,989

GENERAL MOTORS CORP., Foreign Dist. Div., New York, N. Y.
Trucks—6 ea.—$10,595

GENERAL MOTORS CORP., GMC Truck and Coach Div., Pontiac, Mich.
Automotive spare parts—various—$70,752 (Modification)
Transmission and repair parts—$125,598 (Modification)

GENERAL TIRE & RUBBER CO., Akron, Ohio
Main wheels and brakes for F-100D aircraft—$1,043,792

GILFILLAN BROS., INC., Los Angeles, Calif.
Furnishing and delivering of depot replenishment repair parts for Corporal Missile System: (1) $39,801; (2) $42,195; (3) $28,693; (4) $53,320; (5) $38,016; (6) $6,518; (7) $26,348; (8) $32,353; (9) $131,496; (10) $48,275; (11) $57,750; (12) $29,691; (13) $32,661

B. F. GOODRICH CO., Akron, Ohio
Wheel assys.—various—$84,358

B. F. GOODRICH CO., Dayton, Ohio
Wheel assemblies for spare support for C-46 aircraft—$172,443

GOODYEAR TIRE & RUBBER CO., Akron, Ohio
Tire, 9.00 x 16—1435 ea.—$39,304

HOLLEY CARBURETOR CO., Van Dyke, Mich.
Aircraft carburetor spare parts, applicable to J57 aircraft engines—291 items—$97,741

THE FRANK G. HOUGH CO., Libertyville, Ill.
Type MB-2 tractors—$92,505

INTERNATIONAL GEAR CO., Detroit, Mich.
Replenishment spare parts—611 ea.—$33,892

INTERNATIONAL HARVESTER CO., Melrose Park, Ill.
Tractors, crawler-type, Diesel-powered—4 ea.—$64,274

LOCKHEED AIRCRAFT CORP., Marietta, Ga.
Repair and modification of Wheel Ski on C-130A airplane—$180,000

LOCKHEED AIRCRAFT SERVICE OVERSEAS, INC., Ontario, Calif.
Parts, components, material, data and services to support Kawasaki Aircraft Co., Ltd., Japan in the assembly of T-33A aircraft—$1,721,251

(*Turn to page* 106, *please*)

THE IMPORTANCE OF HINDSIGHT

Every good driver should realize the need for looking back . . . having a full view of the road behind. He is, therefore, a ready prospect for Guide rear-view mirrors. For safety's sake, no car should leave your showroom or service department without these two Guide Mirrors!

These two specially designed Guide Mirrors can add a great deal to the motoring comfort and safety of your customers. With just a flick of the finger, the View Finder adjusts to filter out headlight glare . . . the Inside-Controlled Side View Mirror provides the *ultimate* in convenience. When suggested regularly, Guide Mirrors can add a sizeable sum to your accessory profits.

Guide Lamp 1908–1958 GM FORWARD FROM FIFTY **. . . BRIGHTEST NAME IN LIGHTS**

GUIDE LAMP DIVISION • GENERAL MOTORS CORPORATION • ANDERSON, INDIANA

(*Continued from page* 104)

THE MARTIN CO., Baltimore, Md.
Fuel cells applicable to B-57 aircraft—$744,293

MILLS MANUFACTURING CORP., Asheville, N. C.
Canopy assembly—11,000 ea.—$881,430

NORTHROP AIRCRAFT, INC., Hawthorne, Calif.
Airframe development program of T-38 jet trainer—$3,150,000

NORTHWESTERN AERO. CO., St. Paul, Minn.
Overhaul of R-1820-76B aircraft engines, overhaul of R-1820-103 aircraft engines—$176,803

PRECISION TOOL CO., INC., Memphis, Tenn.
Services—Class 51A engines—$25,424 (Estimated)

ROCKWELL SPRING AND AXLE CO., Timken-Detroit Axle Div., Detroit, Mich.
Automotive spare parts—1107 ea.—$28,096

RYAN AERONAUTICAL CO., San Diego, Calif.
Product improvement for Q-2 drone system—$165,000

STANDARD AIRCRAFT EQUIPMENT Co., Inc., Mineola, Long Island, N. Y.
Repair of PB-10 autopilot system components—1300 ea.—$42,099

SUNDSTRAND MACHINE TOOL CO., Rockford, Ill.
Transmission, gear box, shaft, connecting, applicable to F-100D aircraft—$496,300
Transmission assy. applicable to the F-100D aircraft—$1,235,574

THE O. A. SUTTON CORP., Wichita, Kans.
Engineering and packaging changes to 230 gallon, external, jettisonable fuel tank applicable to F-102 and F-106 aircraft—$105,481

TEMCO AIRCRAFT CORP., Greenville, Texas
Inspection, progressive aircraft reconditioning, technical order compliance, modification and flight test of C-97 type aircraft—$234,460

UNITED AIRCRAFT CORP., Sikorsky Aircraft Div., Stratford, Conn.
Overhaul of blade assemblies used on H-19 type U. S. Army helicopter and H-34 type U. S. Army helicopters—157 ea.—$69,547

WESTERN ELEC. CO., Burlington, N. C.
Nike spare parts & components—$255,929

WILLYS MOTORS INC., Toledo, Ohio
Trucks and spare parts—1 lot—$93,590
Misc. automotive commercial spare parts for ¼ ton vehicle—$166,066
Fire trucks—3 ea.—$20,370
Trucks—26 ea.—$53,974

ZENITH PLASTICS CO., Gardena, Calif.
Tip assembly, wing—25 ea.—$76,529

Ford Div. Establishes Office For Advanced Truck Planning

Ford Div. has established an office for developing the "truck of the future," working on such projects as the use of light weight metals to increase payloads. The Advance Truck Product Engineering Office, with J. L. Hooven as executive engineer in charge, will have no connection with engineering present models, according to division general manager J. O. Wright.

no chipping - no rusting
no pitting - no peeling

no work-no worry

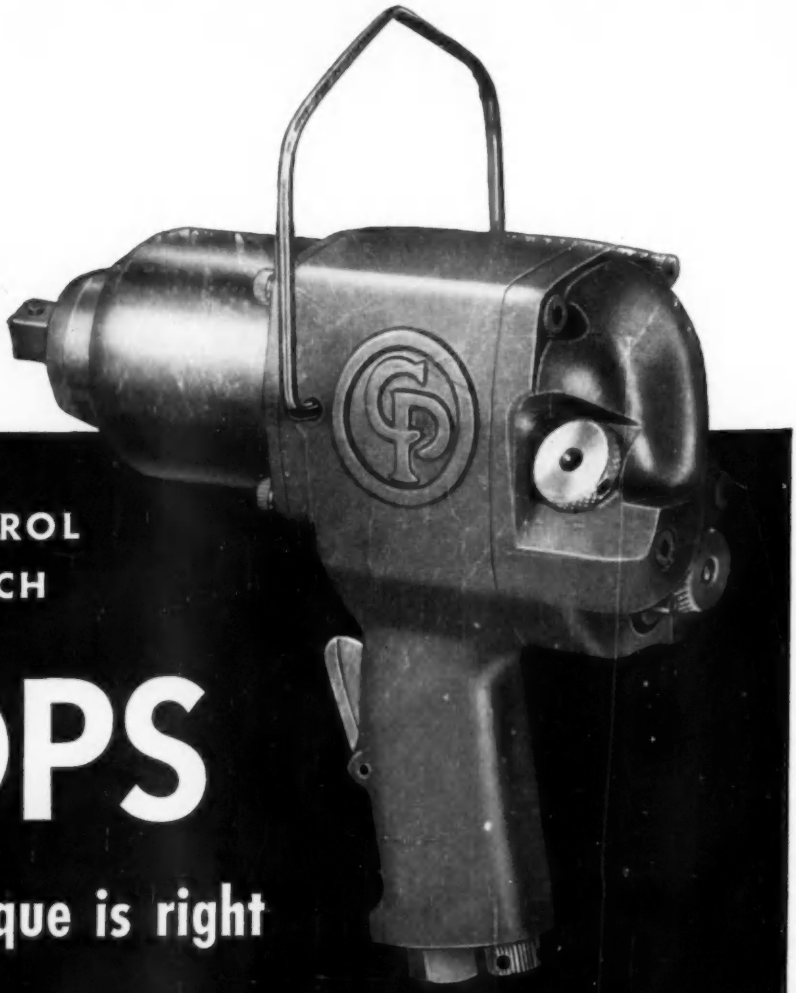
with ever-bright brightwork of

Superior stainless steel

Let it rain, mist or dew . . . for the lifetime of the car, stainless steel brightwork never needs care. Exposure to the elements can't harm it. You don't lift a finger or pay a penny to keep the showroom shine of *stainless*. ● Strong, hard, ever-bright stainless steel will serve you best on your new car, and protect top value when you sell. *And the chances are, it'll be* SUPERIOR.

Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA

NEW



TORQUE CONTROL IMPACT WRENCH

STOPS

when the torque is right

Ideal for production line work! The CP-3440-RTS Reversible Air Impact Wrench gives you faster "run downs" to the *exact* tightness—then *automatically* cuts out. It completely eliminates "over torque". Torque control is simple to set on the job, requires no tools or jigs. Adjustment remains constant until change is desired. For detailed information write: *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, New York.*

TORQUE SELECTOR permits full-speed run-down to desired tightness without limiting impact action or cutting production rates.

AIR RESTRICTION VALVE sets up secondary torque adjustment ranges for lighter work.

RANGE OF TORQUE ADJUSTMENT—12 to 80 foot pounds.

SHORT OVER-ALL LENGTH—only 7½"—permits close-quarter work; weighs 6⅞ pounds.

CAPACITY: ⅜" bolt size—heavy duty.

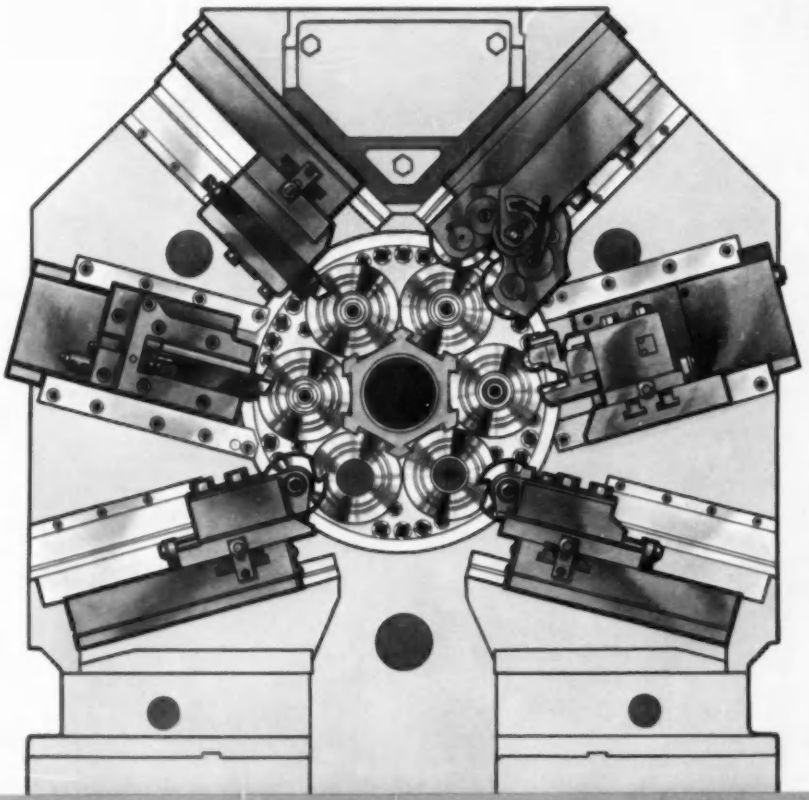
Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Look at New Britain's

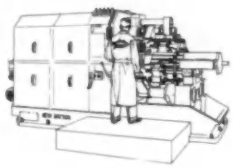
new cross slide arrangement

Independent radial cross slides in *all* positions, providing maximum clearance for more cross slide operations.

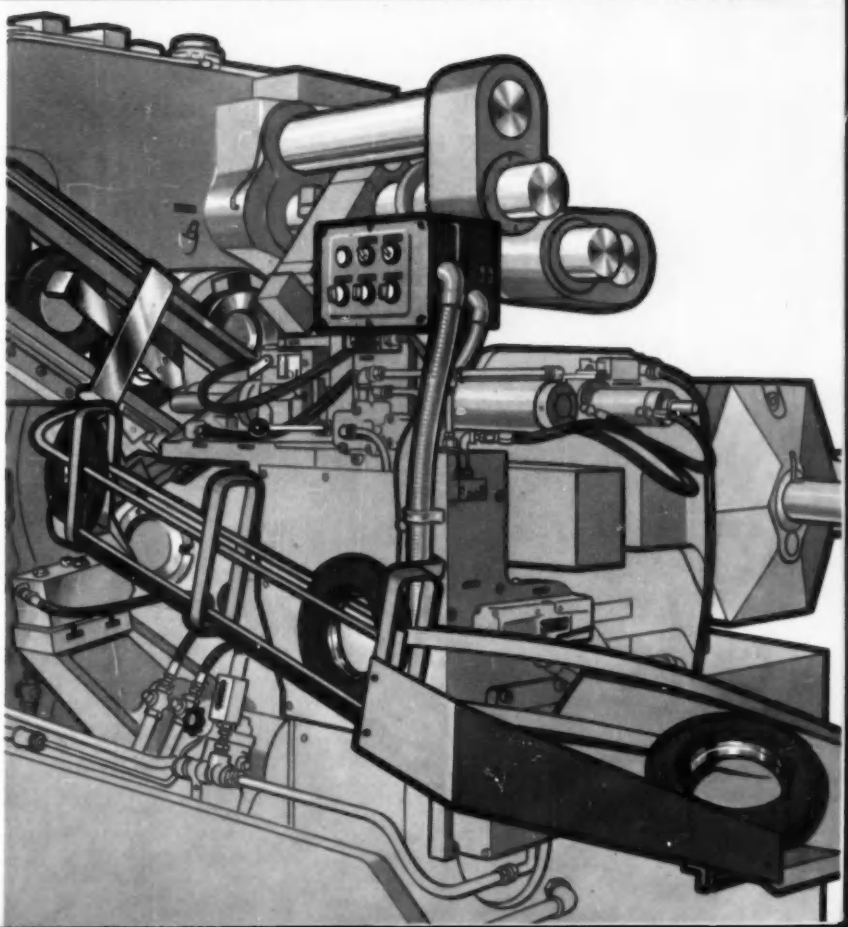


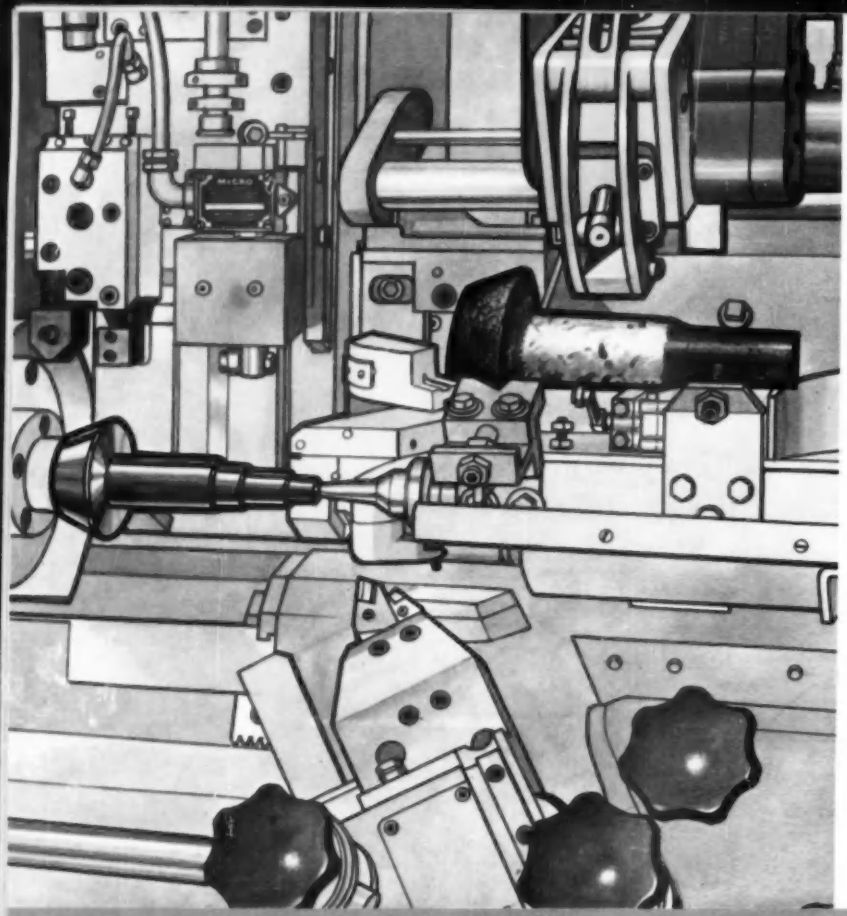
Look at New Britain's

open-end chucker design

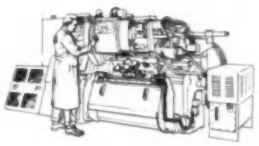


Greater accessibility for all applications and particularly well adapted to automatic handling of pieces. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.

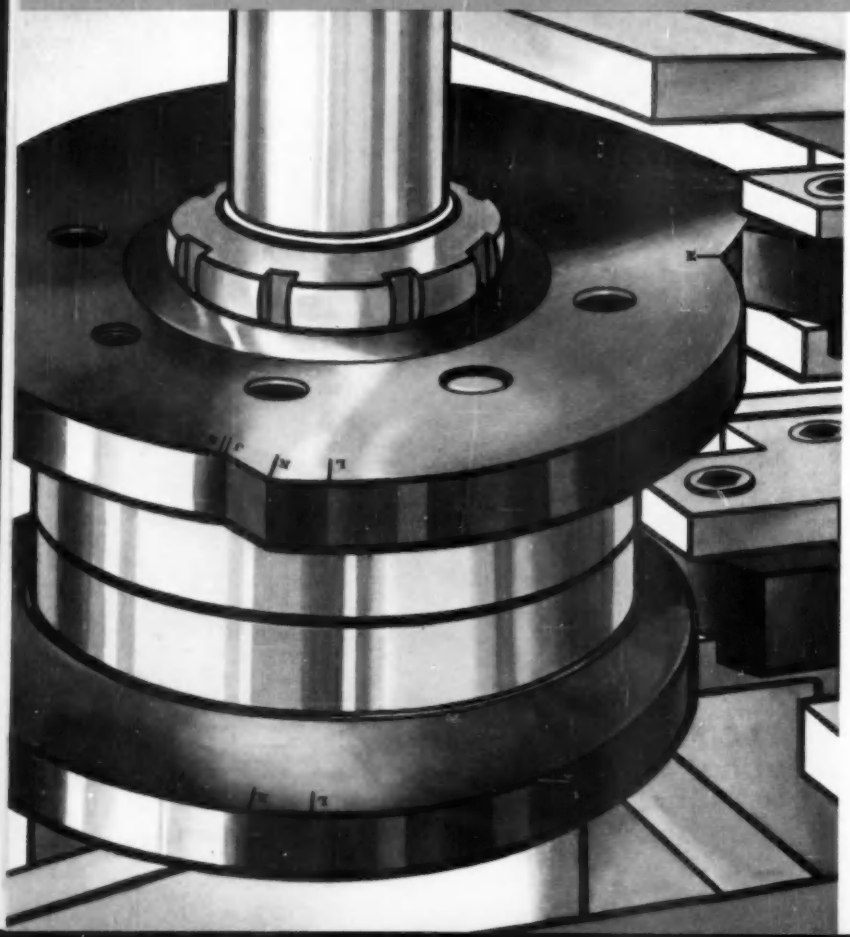




Look at
Automatic Loading on
New Britain +GF+



This basic optional feature can make money for you whether you are working with forgings, bar slugs, or bar stock.



Look at New Britain's
cam-controlled boring machine

When you are working to tenths there is no substitute for the positive tool control that only precision cams provide. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.

MACHINERY NEWS

(*Continued from page* 79)

Ill. The new location has 12,500 sq ft of floor space, more than double the prior, giving increased facilities for production of the company's existing line of cut-off machines. It also provides space for new rotary machines being introduced into the line.

United Drill, Greenfield Planning Merger

A plan for merger of United Drill & Tool Corp. and Greenfield Tap & Die Corp. has been approved by both corporations' directors. Under the merger plan the new company name will be United-Greenfield Corp. Combined assets of the two firms are some $40 million. The proposal is subject to stockholder approval.

Tool and Die Makers Look For Upturn

Members of the National Tool & Die Association attending the recent 12th annual meeting in Chicago reported business somewhat depressed in general, but with indications for an upturn early in 1958.

Tooling for 1959 automobiles is expected to liven the industry's activity in the near future. Some shops doing body tooling anticipate a one-third increase in the volume of business for 1959 over the 1958 model tooling.

Eastern tool and die manufacturers are experiencing a shortage of work, brought on by reduced activity in Long Island and New England aircraft plants. Also the normal fourth quarter pickup in radio and television components and other industries has not materialized.

Sputnik has revived slowing West Coast plants that suffered from defense aircraft cutbacks, with missile work now producing more inquiries in weeks than were received in prior months.

The conferees were told by Martin R. Gainsbrugh, chief economist of the National Industrial Conference Board, that although the capi-

tal goods boom has "topped out," 1958 can still be a good year—"not the best, but a very healthy one." He stated there is no cause for pessimism among capital goods producers. Even if capital spending is reduced by five per cent, 1958 will still be the second best of any year from 1955 on back. The backlog of new orders for capital equipment is still about $50 billion, he said.

The association elected the following officers for 1957-58: *President*—P. R. Marsilius, executive vice president, The Producto Machine Co.; *first vice president*—Jack Kleinoder, secretary-treasurer, Volkert Stampings, Inc.; *second vice president*—H. G. Murdock, vice president, Arrowsmith Tool & Die Corp.; *treasurer*—R. C. Renner, president, The East Dayton Tool & Die Co.; and *secretary*—J. A. Perdy, vice president, Atlantic Mfg. Co. Executive vice president George S. Eaton and assistant executive secretary Charles E. Bender will continue in their respective capacities.

NMTBA Recruiting Booklet Now Available on Order

"Machine Tool Industry for an Assured Career" is the title of a new booklet prepared by the Training Committee of the National Machine Tool Builders' Association. Its aim is to recruit graduates from engineering schools, technical institutes and high schools into the machine tool industry. The booklet is attractive and interesting, and should be very effective.

One of the main considerations in its preparation was to make it adaptable for use by individual companies. Sections devoted to information on your own particular company can be incorporated, and portions of the format may be "personalized" for company use. Copies imprinted with the company's name and containing the company's material in the last two pages are obtainable from the association at $25 per hundred, plus $15 apiece for photographs. Minimum orders with company information should be for 200 copies.

Prongs snap into punched or drilled hole

CUSTOM-DESIGNED AND MASS PRODUCED TO YOUR PARTICULAR REQUIREMENTS

Dot plug buttons were originally used in automobiles to fill spaces on standard models which, on de luxe models would be occupied by such extras as cigarette lighters, radio controls and so on. They are now also widely used as lenses for indicator lights and as identification buttons on instrument and control panels of all kinds.

Available in clear or colored plastics... brass or steel in all standard finishes... embossed and enamel-filled or molded to show company insignia or other identification symbols . . . Dot plug buttons snap into place and stay where they're put even under conditions of extreme vibration. Yet they can be removed and replaced repeatedly without damage.

CARR FASTENER COMPANY

DIVISION OF UNITED-CARR FASTENER CORPORATION 31 Ames Street, Cambridge 42, Massachusetts

MAKERS OF DOT FASTENERS

AIR SPRINGS . . . their Effect on Passenger Car CHASSIS DESIGN

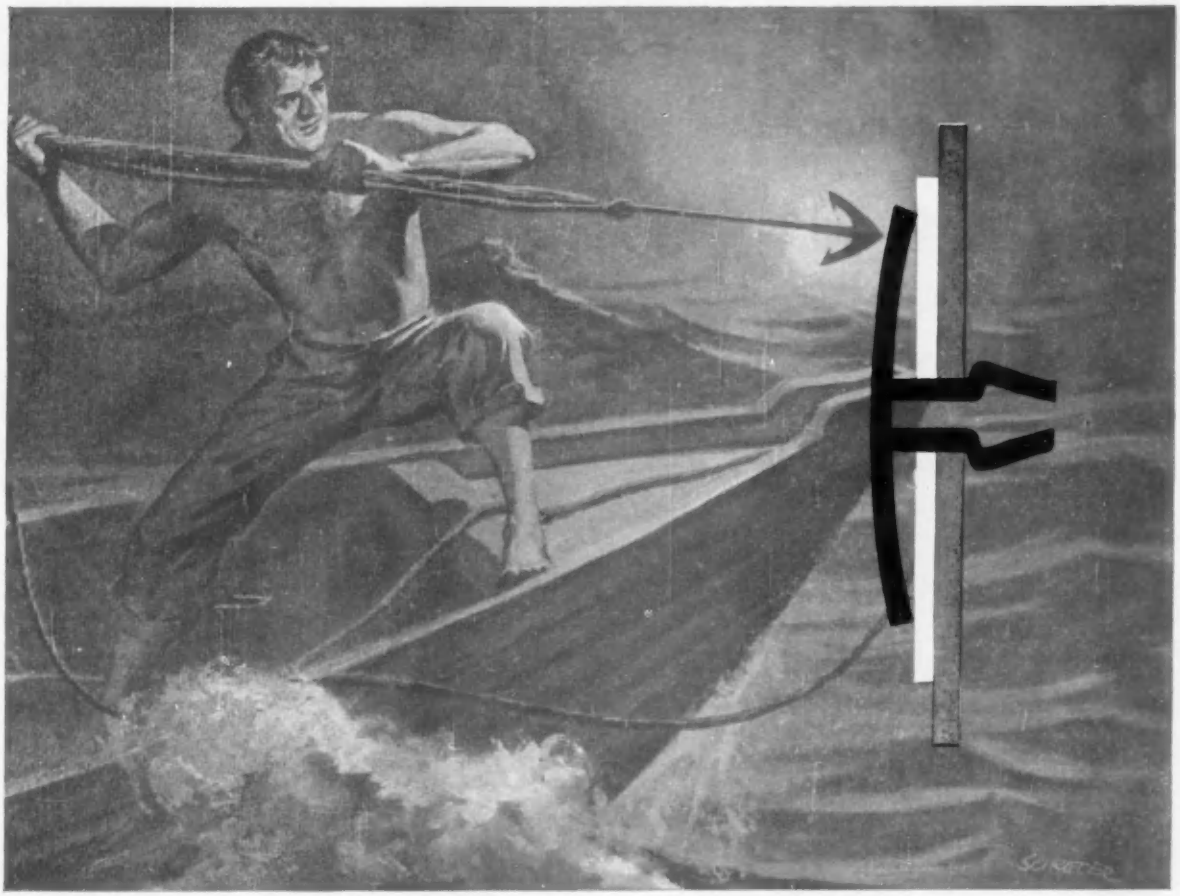
(*Continued from page* 57)

discussed later. Power squat and brake lift at the back can be controlled by geometric means with an axle type but spring alignment problems are increasing at the rear, particularly where a high roll center is attempted as by a top "A" type link or a Panhard rod located above the height of the axle center. For independent rear suspension, particularly if the brakes are moved inboard, the brake lift and power squat problem at the rear is hard to solve except by valving.

The problem of controlling roll with very soft springing is aided by the continued reduction in the center of gravity and also by the current tendency to raise the front roll center three inches or so above the ground. Also, a roll bar at the front certainly reduces roll and increases the under steer characteristics but it seems probable that anything as low as 30 cpm natural frequency leaves some problems in holding the car reasonably horizontal during braking, power and cornering.

One promising area is the leveling in an angular sense as well as height, as made possible through control of the air springs. This problem has been approached in several ways. Where frequencies stay above roughly 50 cpm the vehicle may be sufficiently stable inherently. At some lower frequency the vehicle may not maintain a satisfactory angle to the plane of the road. In that area it seems probable that leveling valves that have a time lag of only approximately half the free bounce cycle should be acceptable. This is, with a natural frequency of 20 cpm, a valve having a time lag of a little over one second might be acceptable. However, the vehicle will start to squat or roll before the valves comes into action, and would over correct for a short period after the disturbance stopped. The next possibility would be valves that operate almost instantaneously, which introduces another field of suspension where the vehicle actually rides "on the valves" and on the power system. Still another possibility is a device which permits the air suspension to adjust level more quickly when power or brakes are applied, or when the vehicle is cornering.

Every type of air suspension involves reduction in spring rate. This in turn has permitted a marked reduction in harshness and noise level, but these changes have emphasized the necessity of reducing parasite rates of hinge points and mountings and of providing some degree of controlled elasticity at the right points. Any geometric elasticity introduced in suspension



HARPOON-ACTION FASTENER
simplifies front mounting

Thrust this Tinnerman Dart-Type SPEED CLIP® through the front of a panel. Spring-steel fingers compress, then expand to lock tight, never to loosen until you pull the clip out.

This time-saving SPEED CLIP feature can be combined with other Tinnerman fastening principles and almost any spring-steel shape. Result—multi-purpose, cost-cutting fasteners that solve a variety of fastening problems. You eliminate screws, nuts, lockwashers, secondary fastening methods. You reduce parts handling and achieve a faster, smoother assembly-line flow.

Your Tinnerman representative can show you these and many other SPEED NUT® Brand Fasteners that can help take assembly costs out of your products. Call him today. Or write to . . .

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Speed Nuts®

FASTEST THING IN FASTENINGS®

CANADA: Dominion Fasteners Ltd., Hamilton, Ontario. GREAT BRITAIN: Simmonds Aerocessories Ltd., Treforest, Wales. FRANCE: Simmonds S.A. 3 rue Salomon de Rothschild, Suresnes (Seine). GERMANY: Mecano-Bundy GmbH, Heidelberg.

members must be carefully considered, but any statement that elasticity increases harshness or noise would seem to imply that the elasticity was in the wrong place or tuned in the wrong range. The characteristics of the mountings, hinges and points of attachment are very important in the reduction of noise level and harshness.

Air-oil springs can be analyzed or calculated by the same methods used for air springs except that the air-oil spring behaves like a different air spring each time the load is changed. Since the weight of trapped air or gas is constant, and the volume changes with each load, the air-oil spring rate increases faster than the load so that frequency increases as load increases, which makes this type less attractive for commercial use. Figure 7 shows the change in ride rate for three springs, "A" being an uncontoured air spring giving $\frac{K_n}{K_i}$ ratio of 1.4, "B" being a contoured air spring having ratio of 2.5 at 1000 lb load and "C" being an uncontoured air-oil spring. Each of these three springs is designed for 50 lb per in. spring rate at 1000 lb load and 200 lb system pressure.

Figure 8 shows a group of the air springs made at The B. F. Goodrich Co. In addition to the types described above, these springs can also be divided into two classifications, first, those which operate in the circular opening between a plunger and a metallic retainer or can, and second, those which have no external metallic can. A closer control of spring rate can sometimes be obtained with the completely enclosed type spring. However, greater misalignment can be tolerated on the type of spring which is not enclosed.

Figure 9 shows schematically the type of spring with no external can or retainer.

A further division can be made between the type springs in which one element is hinged, as in Fig. 1 and those springs where both elements are fixed as in Fig. 10. Here again a further division can be made for the enclosed, fixed element type spring designed as a

PRECISION THRUST WASHERS

with design flexibility and manufacturing economy

The method of manufacture permits flexibility for money-saving design features. They can be plain bronze, or steel with bronze on one or both faces, in flat, spherical or special shapes. Coining of special lubrication grooves, for example, saves on costly machining. Holes, nibs, lugs or scallops are incorporated, as desired. They are cold rolled for exceptional hardness in heavy-duty operation. Used in automatic transmissions and similar bearing applications. From 1″ to 6″ O.D. We have large capacity and provide complete engineering service.

FEDERAL Mogul SINCE 1899

FEDERAL-MOGUL DIVISION

FEDERAL-MOGUL-BOWER BEARINGS, INC., 11037 SHOEMAKER, DETROIT 13, MICHIGAN

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torus-like section as shown in Fig. 11.

One promising aspect of the development of air springs for passenger cars is that if and when the trend toward ever bigger and heavier cars stops, the air spring will aid the designer to develop a low car of pleasing appearance and with ride and handling approximately that of the larger cars.

• • •

GM Reports 700,000 Owners With Wilson One of Newest

General Motors reports it has more than 700,080 shareholders, an increase of 200,000 in the past 2½ years. In addition, the corporation has some 92,000 employes who are participating in a Savings Stock Purchase Program.

One of the newer shareholders is former GM president Charles E. Wilson, who recently purchased 500 shares of GM stock on the market. He had sold his holdings when he became Secretary of Defense, now is a member again of the GM board of directors.

M-H-F Will Move Plant from Racine to Detroit

Massey-Harris-Ferguson, Inc., will move its tractor manufacturing operations from Racine, Wis., to Detroit after June 30, 1958. The Racine plant will be converted into warehouse area for replacement parts, according to the subsidiary of the Canadian tractor firm, Massey-Harris-Ferguson, Ltd.

The subsidiary is spending $4 million to expand the Detroit plant to double its present size. Work on the expansion is scheduled for completion next month, and new capacity at the plant will be 250 tractors a day.

Square D Now Operating New Assembly Facility

Square D has opened a $500,000 plant in Atlanta, Ga., for assembly of electrical equipment, chiefly switchboards, circuit breakers, control centers and related devices for industrial, commercial and residential use.

The 31,000 sq ft plant is part of an operating pattern which uses smaller assembly plants to incorporate elements that are mass-produced at the major manufacturing plants in Detroit, Milwaukee, Cleveland and Los Angeles. Other assembly plants are located in Dallas, Denver, Seattle, San Francisco and Secaucus, N. J.

All types of molded friction materials, including light- and heavy-duty brake linings and thick blocks, clutch facings and special products for industry.

Sintermet — sintered metallic friction materials for transmission and clutch applications in the automotive, aircraft and industrial fields.

American Brakeblok

OFFERS

BOTH KINDS OF FRICTION ENGINEERING

To meet new and higher performance requirements of brake and transmissions systems as dictated by steadily rising levels of power, speed and loading, American Brakeblok has developed a full line of advanced friction materials . . . both sintered metallic and molded.

Insuring prompt fulfillment of each friction need are the organization and facilities of American Brakeblok:

- *Research:* Continued development has provided proven friction materials capable of meeting your design needs.
- *Testing:* Comprehensive lab and road evaluations, compiled into detailed reports for your project, substantially shorten your own testing time.
- *Production:* Three modern plants are equipped to guarantee specified quality in each product and have a capacity to meet the needs of millions of vehicles and machines annually.
- *Service:* Highly trained application engineers work hand in hand with your project team . . . insuring "no lost motion" even if design changes alter your original requirements.

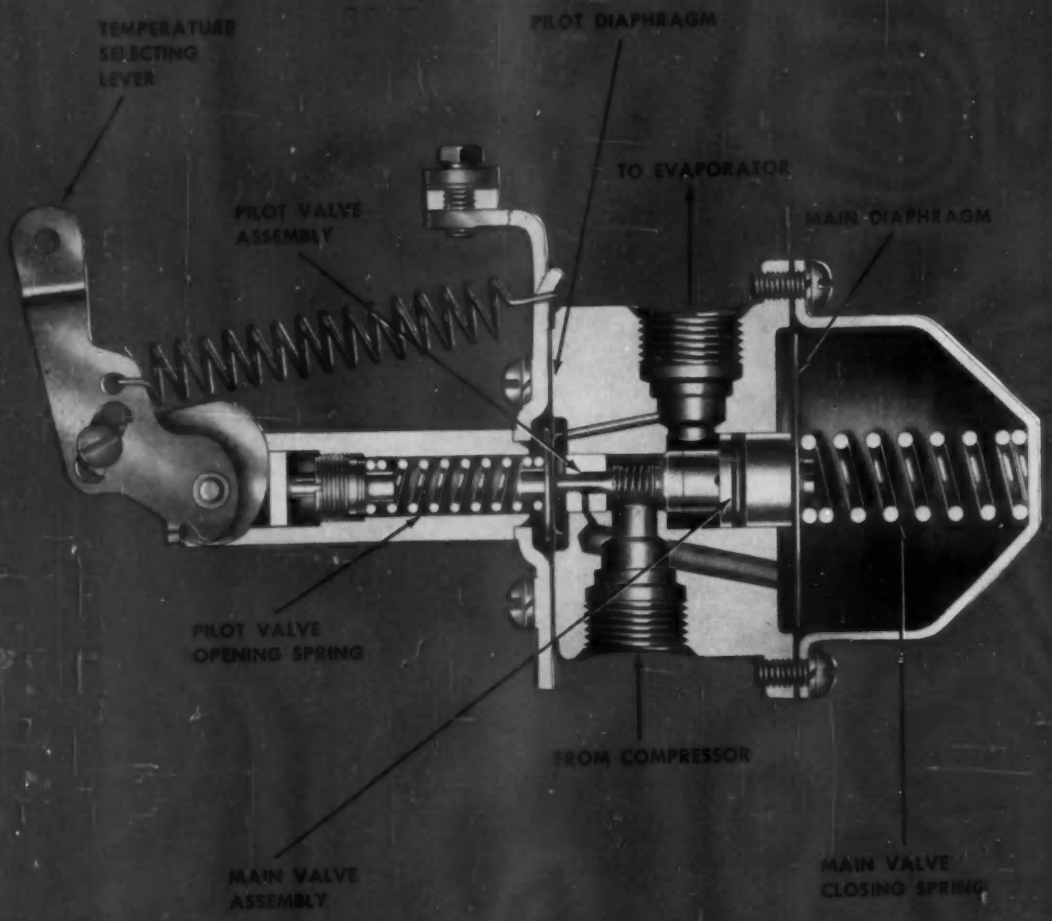
To realize the full advantage of the American Brakeblok capabilities, we suggest you check with us during the initial stages of your brake or transmission design. A call or letter will bring quick action.

Brake Shoe

AMERICAN BRAKEBLOK DIVISION

DETROIT 9, MICHIGAN

PROGRESSIVE ENGINEERING MAKES THE DIFFERENCE



NEW DELCO-REMY HOT GAS BYPASS VALVE FOR AUTOMOTIVE AIR-CONDITIONING SYSTEMS

NEW DELCO-REMY HOT GAS BYPASS VALVE ON ALL AIR-CONDITIONED GM CARS FOR 1958

To provide controlled, freeze-free operation in an automotive air-conditioning system, Delco-Remy has developed a special hot gas bypass valve. Simple in design, rugged in construction, this mechanical unit produces more even temperature control through its continuous regulating action.

The new unit solves the problem of maintaining constant car temperature at various car speeds and compressor outputs. Once set by the temperature control lever in the driver's compartment, the valve automatically meters the required amount of hot gas from the compressor directly to the evaporator to provide continuous control of evaporator pressure and temperature.

The new Delco-Remy hot gas bypass valve is used on all 1958 General Motors cars equipped with air conditioning. It is another example of Delco-Remy advanced leadership "Wherever Wheels Turn or Propellers Spin."

DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

GM GENERAL MOTORS

GENERAL MOTORS LEADS THE WAY—STARTING WITH

Delco-Remy

ELECTRICAL SYSTEMS

ON OUR WASHINGTON WIRE

Sen. Ralph Flanders, R. Vt., contends that cost-of-living pay raises are self-defeating for workers because they fuel reciprocating actions—pushing up costs, which push up prices, which push up wages anew. Wage rises should be based solely on gains in productivity, he argues.

The White House is warning against any dilution of the present reciprocal-trade pattern and a consequent upward movement in U. S. import tariffs. The 1958 White House pitch for lower tariffs is already taking shape along these lines (Gabriel Hauge, economic adviser, talking): "We cannot keep the American economy healthy divorced from the world economy. We have a vast export market, which is extremely vital to our prosperity."

Civil Defense planners are going to ask for a $34 billion shelter construction program. Most shelters under this plan would be of reinforced concrete and house schools, hospitals, garages, and defense installations. Planners figure we'll only have a 15 minute warning before future attack.

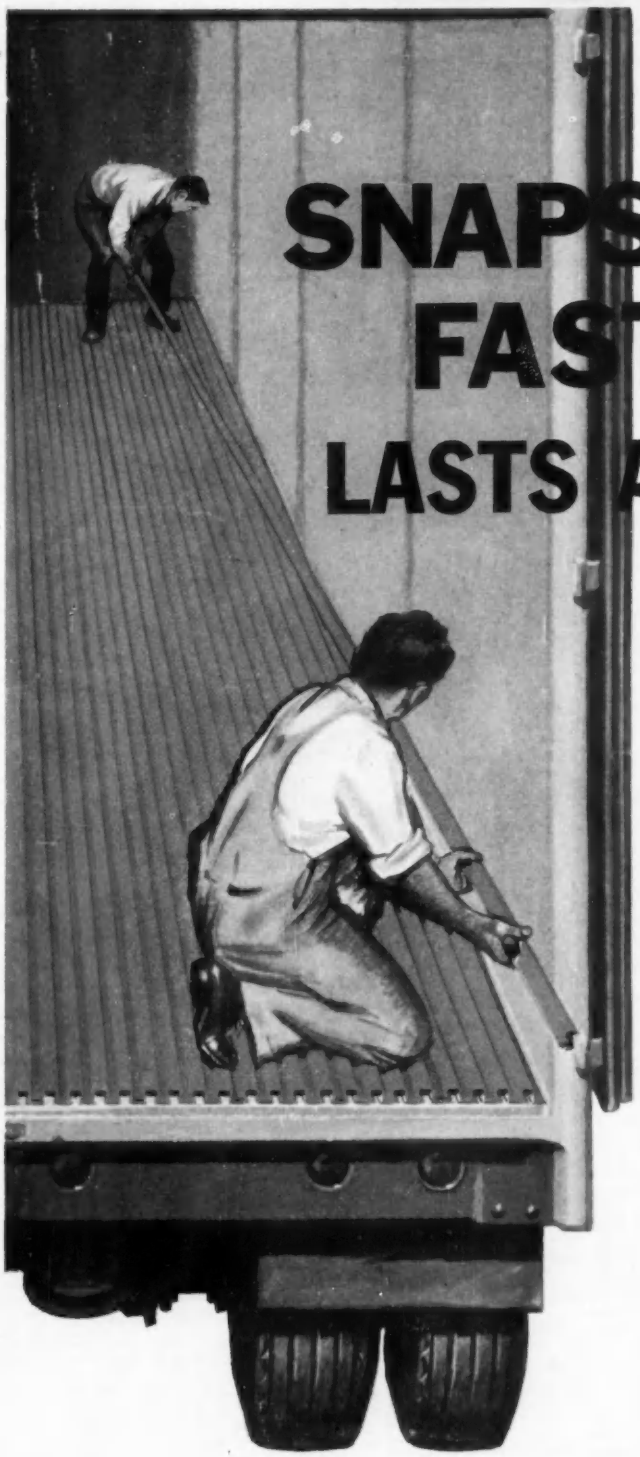
Senator Humphrey, D., Minn., says he will propose the creation of a new Cabinet position—that of "Secretary of Science." The new Secretary would have complete charge of all Federal activities in the field of science, engineering, and advanced technology.

A recent survey of Army scientists and engineers shows that only 38 per cent of an engineer's time was devoted to creative engineering projects. The balance of the time was lost on such nonproductive tasks as ordering office supplies and making out vacation schedules.

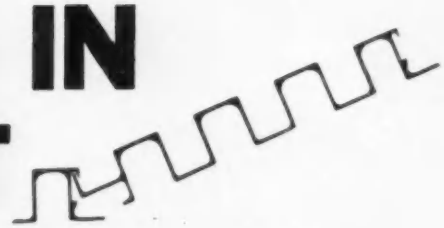
Atomic radiation may take over the job of heat in applications where realignment of molecules improves product life. Radiation has been successfully used to replace heat in vulcanizing rubber, eliminating need for adding chemicals, including sulfur. Radiation-vulcanized tires reportedly wear longer and resist deterioration better than heat-vulcanized ones.

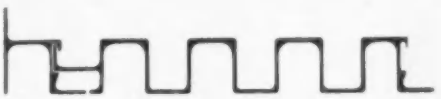
Drastic revision in the government's basic mobilization stockpile program appear to be in the making. A special citizens committee, composed of about a dozen "objective experts" on metals and minerals and other stockpile materials, will soon embark on a "broad-range" re-evaluation of present stockpile policies, programs and procedures. The committee will look at the strategic and critical stockpile programs material by material.

(Turn to page 124, please)



SNAPS IN FAST LASTS A LIFETIME!





BRIDGEPORT ALUMINUM "SNAP-IN" REEFER FLOOR

It's unique—Bridgeport's new design in reefer floors. Easy-to-install, individual extruded sections lock together, form a permanent, flat, weathertight floor, even in 30- to 35-foot assemblies. No boltholes through floor. Hours of installation time are saved—payloads are bigger because of weight savings—and maintenance costs go down, because of the long-life qualities of corrosion-resistant aluminum.

"Snap-in" floor sections are one of many designs in Bridgeport's complete line of standard aluminum truck and trailer shapes available without die charge. All are designed and extruded with the high standards and exact needs of the truck and trailer industry in mind. Custom-designed shapes, too, in any temper or alloy, can be made by Bridgeport to meet your specifications. Your nearby Bridgeport Sales Office is ready to serve you. Call today.

Write on your letterhead for Bridgeport's new Aluminum Extrusions Handbook—a 130-page manual with complete sections on truck and trailer construction, full size shapes available, data, limits and tolerances.

For the very newest in

BRASS Bridgeport CO.

BRIDGEPORT ALUMINUM

Aluminum Extrusion and Forging Facilities at Adrian, Michigan

Bridgeport Brass Company, Aluminum Division, Bridgeport 2, Connecticut • Offices in Principal Cities

(*Continued from page* 122)

A lively battle over price controls is in the making. The Eisenhower administration and some congressmen (both Democrats and Republicans) believe the Federal Government should be armed with standby authority to control prices. Congressmen who are opposed point to the soft market conditions that exist in many lines.

Most important outcome of present anti-secrecy campaign being led by Rep. John E. Moss, D., Calif., is concentrated pressure for easing secrecy barriers between scientists in and out of the military to speed up this country's research program.

Joint Government-private investment trusts to provide funds for small firms are being suggested by leading stock market experts as a possible method of easing the plight of small business. Under the plan, the Government would become direct investors in small manufacturing plants, stores, and other firms through trusts jointly financed by Federal and private capital.

Work aimed at atomic power plants for planes and missiles now has new, central guidance. Maj. Gen. Donald J. Keirn, who's been heading Air Force nuclear engine activity, is the key man in the revamped setup. He is placed in charge of an integrated project office for the Defense Dept. and Atomic Energy Commission.

Intensive Air Force research on design of jet engine noise suppressors is turning out well. Search for a standard unit goes on, but at least one type has had a successful test record. This is a prefabricated steel silencer that bolts together. For larger engines, extra prefabricated sections can be added.

Too much fussing over secrecy on missile development is killing off progress. One leading missile expert says the Pentagon's fever for secrecy is a greater threat to national security than the progress made by a potential enemy.

(*Turn to page* 128, *please*)

resists corrosion

Sea Turtles wear an armored shell that resists both enemies and elements. And Parish Pressed Steel Company, a division of Dana Corporation and a leading manufacturer of automotive chassis and frames, uses A. W. Dynalloy steel for much the same reason . . . resists corrosion!

There are other reasons, of course. A.W. Dynalloy is

. . . stronger per unit of weight
. . . easy to weld
. . . easy to form

As with Parish Pressed Steel, A.W. Dynalloy can help you get more value per dollar spent for your product. Send for our A. W. Dynalloy booklet which gives complete information. Write Marketing Division, Dept. DY-S90.

A.W. DYNALLOY

ALAN WOOD STEEL COMPANY

steelmasters for more than a century and a quarter *CONSHOHOCKEN, PA.*

DISTRICT OFFICES AND REPRESENTATIVES: Philadelphia • New York • Los Angeles • Atlanta • Boston • Buffalo • Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle • Montreal & Toronto, Canada—A.C. Leslie & Co., Limited

Two extra reasons truckers always

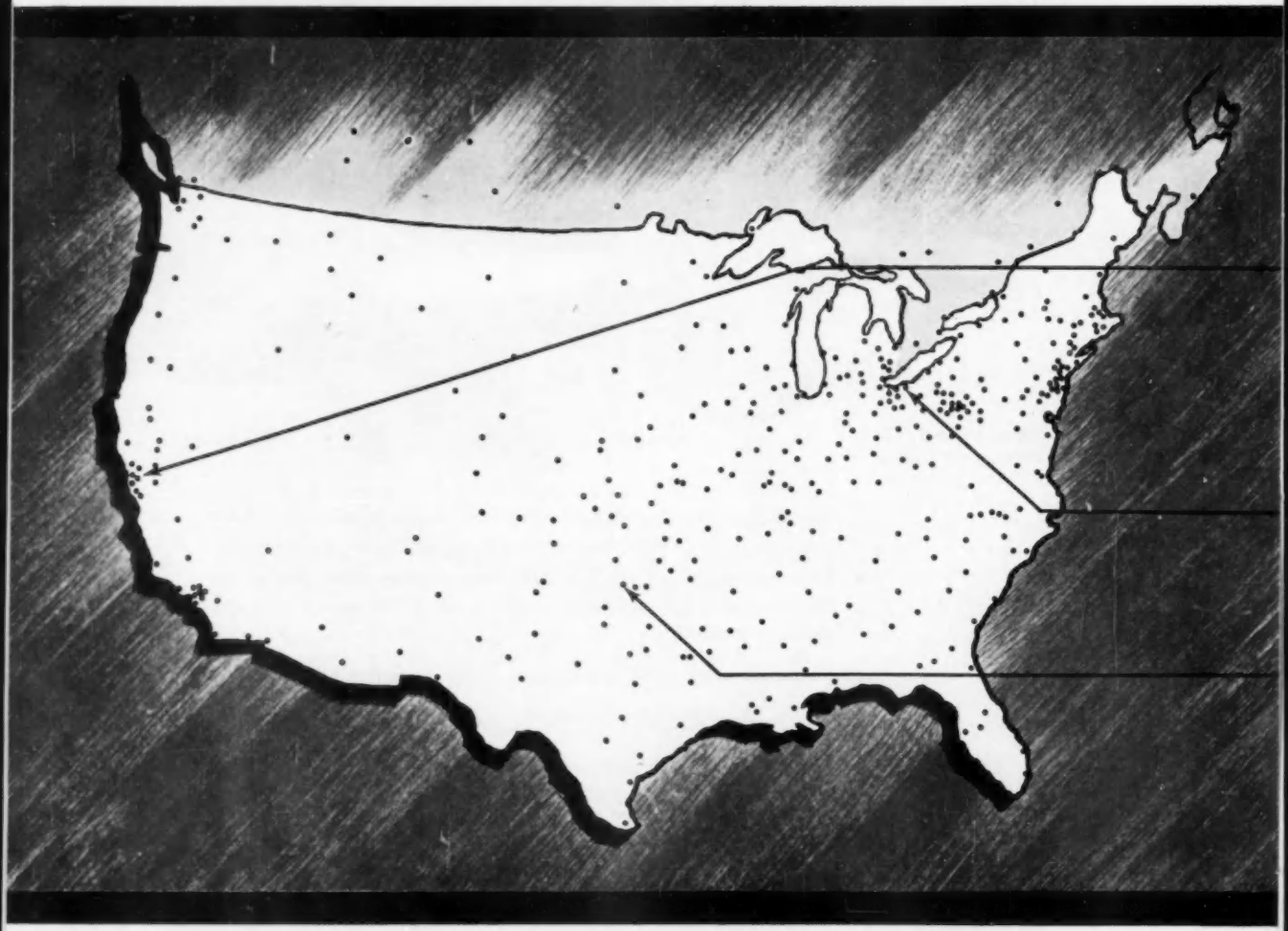
Monroeville, New Lisbon, Seminole. Know where they are?* You might think these unlikely places for Bendix-Westinghouse distributors to be. But you'll find them there. And in hundreds of other cities and towns in all parts of the United States and Canada.

The point is that anywhere your customers' units go they're never far from a Bendix-Westinghouse distributor with trained air brake equipment experts and a complete stock of replacement units and service parts to handle any maintenance or repairs your customers may need.

This is an extra advantage they get *only* when they use Bendix-Westinghouse Air Brakes.

*In Ohio, Wisconsin and Oklahoma respectively

first in sales and service



BENDIX-WESTINGHOUSE AIR BRAKES
AUTHORIZED DISTRIBUTOR SALES - SERVICE

Truckers always look for this illuminated sign . . .

Or check the classified pages in their phone book

BENDIX-WESTINGHOUSE AIR BRAKES
SALES—SERVICE GENUINE FACTORY RECONDITIONED UNITS
"WHERE TO BUY THEM"

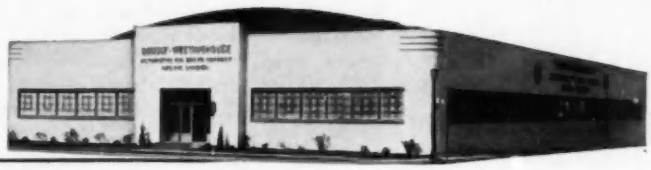
specify BENDIX-WESTINGHOUSE

If you were to check the list over the years, you'd find Bendix-Westinghouse has shown the way consistently in the developments that have meant constantly better and better air brakes.

If you could check operating costs per mile across the country, you'd find Bendix-Westinghouse Air Brakes way ahead in providing fleet operators and truck owners with better stops at lower cost for a longer time.

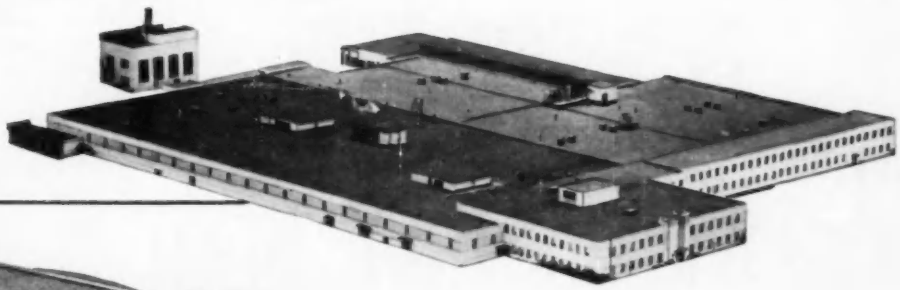
These facts are born of Bendix-Westinghouse research and manufacturing talents—and are two of the biggest reasons why *more trucks travel more miles with Bendix-Westinghouse than with all other air brakes combined!*

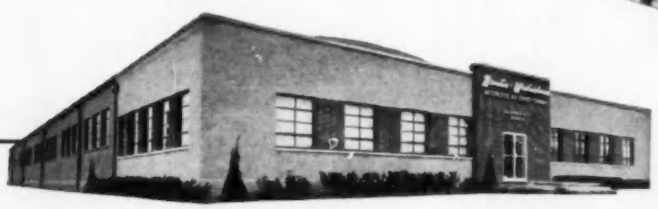
first in research and manufacturing



Berkeley, Calif., branch

General Offices and Factory—Elyria, Ohio





Oklahoma City, Okla., branch

Bendix-Westinghouse

AUTOMOTIVE AIR BRAKE COMPANY

BENDIX-WESTINGHOUSE AIR BRAKES®

AIR BRAKES

(*Continued from page* 124)

Few, if any, Government officials believe labor will pass up any chances for higher wages in 1958. For the most part, they are reacting with skepticism to the proposal of Richard J. Gray, head of the AFL-CIO Building Trades Dept., that labor declare a moratorium on new wage demands next year.

Defense officials are expected to develop a "distilled" missile program, by dropping some missiles and putting heavy emphasis on speeding up others.

Push for improving science education in high schools and colleges may include a scheme to grant science teachers a 10 per cent or higher salary differential. If such a plan is adopted, the Federal Government would either pay the difference directly, or require local school authorities to pay it as a condition to receiving other Federal school aid programs.

The missile-rocket-research push will touch off another shortage of scientists and engineers, Government experts predict. Low birth rate of the 1930s will mean an actual decrease by 1965 in number of men in the 25-34 age group—the group that supplies young scientific talent. Educational speed-up can't help until 1970.

More and more, it's beginning to look as though the 1958 session of Congress will vote the biggest-ever peacetime budget. Tax reduction is out of the window, of course; and a return to red-ink budget is likely if Government spending continues to rise. Chances are there won't be any reductions in low-priority Government spending projects, because of the "howls" of the pressure groups.

Congressmen of both parties are demanding a new Federal law to spell out who shall take charge of the Federal Government when a Prresident is temporarily or partially disabled. The question that is bothering a growing list of congressmen is the one concerning executive decisions that cannot be delegated.

(*Turn to page* 136, *please*)

NEW THEW-LORAIN

"Square Tubular-Chord" Crane Boom

The Moto-crane, designed and built by The Thew Shovel Company of Lorain, Ohio, offers a uniquely light, powerful, maneuverable boom. Completely fabricated of Shelby Seamless Mechanical Tubing, the boom consists of four main chords of square tubular construction, reinforced by lacing of round tubing. In sizes, the main chords range from 2″ x 2″ x .189″ wall to 4″ x 4″ x .250″ wall.

The advantages of this type of construction are manifold. The square cross section of the four main chord members gives the greatest radius of gyration for column strength, 15% better than round members, 90% better than angles. This radius is the factor that gives square chord sections the greatest column strength per lineal foot of weight. The result is a weight savings of 20 to 30%, greater strength, and increased lifting capacity. It also permits handling and traveling with longer booms.

Why Shelby Seamless Mechanical Tubing was chosen...

Primarily, it offers the ultimate in strength and rigidity in proportion to its size and weight. Secondly, it is shock-absorbent, uniform throughout, dimensionally accurate, and possesses excellent machining and superior welding properties. It is produced under rigid standards, and is available in a generous range of diameters, wall thicknesses, various shapes and steel analyses.

Contact our engineers. Let them help you to adapt Shelby Seamless Mechanical Tubing to your specifications.

The 35TM Moto-crane unit with straight 105-foot boom and a 20-foot tip extension. Some of these booms have been as long as 200 feet.

National Tube Division, United States Steel Corporation, Pittsburgh, Pa.
(Tubing Specialties)
Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Supply Division, Warehouse Distributors
United States Steel Export Company, New York

USS

SHELBY SEAMLESS MECHANICAL TUBING

A Product of National Tube

WALLS WITHOUT WELDS

UNITED STATES STEEL

A Descaling Bath for Titanium

BECAUSE of its valuable combination of high strength, resistance to corrosion, and weight between that of steel and aluminum, titanium is much used in modern aircraft in spite of its high cost. Even with price reductions that have come since it began to find application in industry, the metal in fabricated form costs about $14 per pound.

Another valuable property of the metal, its high melting point, is difficult to utilize because titanium begins to oxidize at temperatures above about 400 F. This readiness to oxidize is one of the chief difficulties in preparation and hot fabrication of the metal. The scale that forms is tenacious, and difficult to remove in most types of chemical baths. A mixture of nitric and hydrofluoric acids has been used to dissolve the scale, but the acids tend to etch the underlying metal also, and unevenly. Any oil or grease on the surface of the titanium when the metal is immersed in the acid bath greatly retards the action of the acids at that point, and the result is an uneven surface. Careful cleaning of the metals before immersion reduces this fault, but does not eliminate it.

A bath composed of molten salts of the alkali metals dissolves titanium scale, but requires close control of temperature. The temperature must be above 700 F for effective scale removal, and temperatures between 800 and 900 F are favored to speed the process. The danger of ignition of the metal becomes very real at higher temperatures, however. An additional difficulty is that the parts coming from the molten salt bath are discolored, and require additional chemical treatment to brighten them.

All of these difficulties brought about ejections, and rejections of parts made of this expensive metal were costly indeed. The scale itself lowers the corrosion resistance of titanium, makes inspection of parts difficult, and is considered a factor in metal fatigue. Removal of the scale, with the consequent uneven etching of the base metal, frequently removed enough of the metal to reduce the gage of the titanium, causing rejection. Where part of the surface was scaled and part was clean, as in a piece having freshly sheared edges or freshly punched rivet holes, the clean metal was attacked so rapidly that the holes would be perceptibly enlarged by the time the scale was removed. Again the piece would be rejected.

At Temco Aircraft Corp., where many titanium parts are fabricated for assembly into first-line military aircraft, a scale removal process was developed that avoids this damage to the base metal. J. J. Dailey, of Temco's processing laboratories, worked out the proce-

dure, which combines an acid treatment with an electrolytic polishing. It has been patented under the name "Ti-Brite."

The process uses an acid bath, in which the titanium part is attached to the negative lead of a direct current source, and an anode of titanium metal or a ferrous metal is connected to the other lead. Direct current of about 6 to 36 volts is used, depending upon the nature of the work. The composition of the acid bath is as follows:

Hydrofluoric acid (48-70%) — 1% by volume.

Nitric acid (38-46° Bé) — 4% by volume.

Sulphuric acid (60-66° Bè) 20% by volume.

Water—75% by volume.

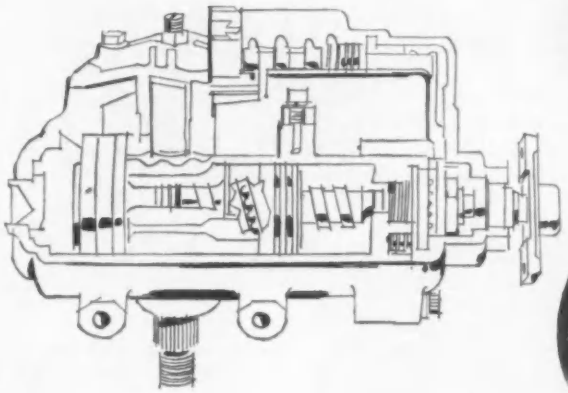
Ferrous Sulphate or aluminum sulphate 3-5 oz. per gal. of liquid. With the work as cathode and a pure metal anode in the bath, the current is passed for from one to three minutes. Current direction is then reversed for the same period to assist in removal of the scale. Polarity is then reversed again, and the current passed until the scale is loosened or removed. The workpiece is then removed from the bath and immediately rinsed in running water at room temperature. After air drying, the parts are inspected for completeness of scale removal, and any parts with scale still adhering are returned to the bath for additional treatment. There is little danger of excessive removal of base metal. Treatments for as long as one hour have shown no detrimental etching of the titanium.

Etching is said to be so delicate that after descaling the machine marks may be seen on the work. The process is used with titanium metal or its alloys.

Ford Div. General Offices Moving to New Dearborn Site

The general offices of the Ford Div. are moving to a new five-story building at Rotunda Drive and Southfield Rd. in Dearborn, Mich. Top administrative offices, public relations and sales began the move Oct. 18; other departments are moving on the following five week ends.

Specify Muskegon design for '58 and '59



POWER STEERING RINGS

Here's Why -

Muskegon ring specialists are ready to help make your power steering units safer and more dependable than ever—with sealing rings built to your exact specifications.

Muskegon offers extensive design and metallurgical experience and complete follow-through from design conception to finished product. Muskegon offers the manpower, the machines and the know-how to produce rings in quantity, when you need them, most economically.

Muskegon engineering encompasses all other types of rings, too, including those for use in engines, transmissions and air conditioning compressors.

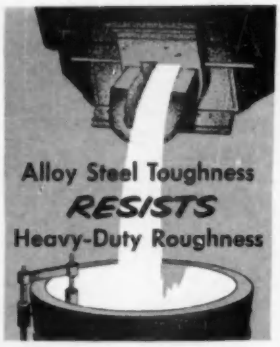
Muskegon is as close as your telephone. Let Muskegon plan and work with you now . . . for better design and performance in the years ahead. Muskegon Piston Ring Co., Muskegon, Michigan.

Since 1921... The engine builders' source!

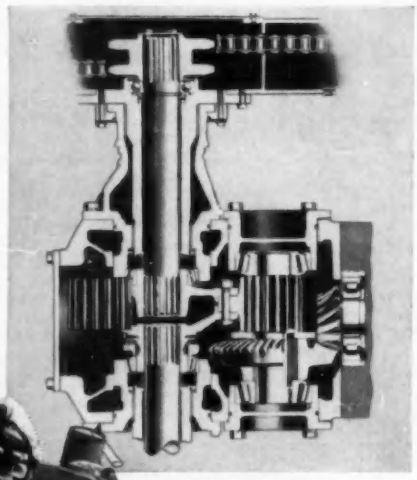
MUSKEGON
Piston Ring Co.

PLANTS AT
MUSKEGON, MICHIGAN
SPARTA, MICHIGAN
ROTARY SEAL DIVISION
PLANTS AT
SPARTA, MICHIGAN
CHICAGO, ILLINOIS

DETROIT OFFICE: New Center Bldg. Telephone: Trinity 2-2113



DRIVE AXLE



Model "660" Motor Grader is built by Adams Division, LeTourneau-Westinghouse Company, Indianapolis, Ind.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

DESIGNED FROM ALLOY STEEL

Shrugs Off Fatigue, Terrific Torque, High Impact Load

Motor graders built by Adams Division of LeTourneau-Westinghouse Company are known throughout the world for quality and dependability.

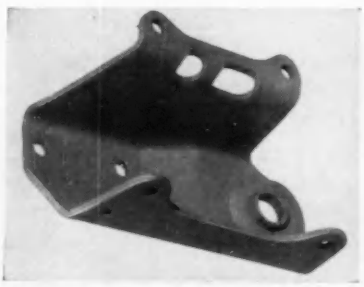
A good example of the company's constant effort to improve this quality and dependability can be found in the grader's full-floating, two-section drive axle—considered to be the most vulnerable part in the entire unit. It is subjected to terrific torque from an eight-speed, constant-mesh transmission. Impact load is often extreme.

Company engineers and metallurgists spent thousands of hours on research and field testing of all types of steels to find one that would reduce ultimate fatigue in the axle to an absolute minimum.

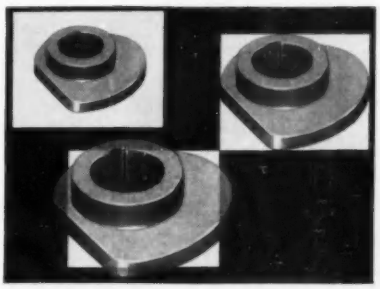
They eventually settled on Republic Hot Rolled 4340 Alloy Steel. This fine steel not only resists fatigue, but also is able to take a high torque without a permanent set. Fatigue failure is now practically non-existent.

Alloy steels provide an outstanding combination of qualities essential to designing smaller sections to move or carry heavier loads with no sacrifice of strength or safety. They resist fatigue, shock and stress. Respond uniformly to heat treatment, producing hard, wear-resistant surfaces around tough cores. This tough, integral structure provides greater strength with minimum weight.

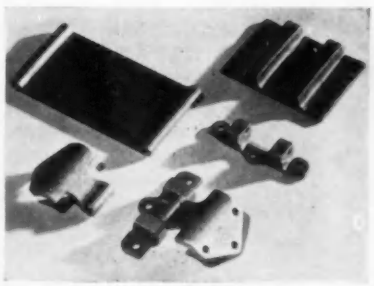
Specify Republic Alloy Steels for your jobs where strength and toughness must resist heavy-duty roughness. We offer you the services of our experienced field metallurgists to help you get the most from these versatile steels at the lowest possible cost. There's no obligation. Just mail the coupon.



COMPLETE DESIGN, engineering and fabricating facilities go to work for you as an extension of your plant when you have your stamped and drawn parts fabricated by Republic's Pressed Steel Division. This truck shaft bracket is one example of a wide variety of steel parts mass produced to specification at the lowest possible cost. Send coupon for Booklet Adv. 681.



DIE AND PART DESIGN PROBLEMS are reduced by 3 new grades of Republic Iron Powder with *Controlled Dimensional Factor.* In the presence of copper, these powders—depending on type—can be made to grow, remain stable, or shrink, within acceptable limits. Complete information on Type "G" for growth, Type "N" for normal, Type "S" for shrinkage are contained in Booklet Adv. 763. Write for it.



LIMITLESS FLEXIBILITY IN DESIGN is provided by Republic Special Sections. They simplify built-up, interlocking or associated parts. Machining time and costs are reduced to a minimum because the sections are preformed to the predominating cross section of the part. Available hot rolled or cold drawn in all grades of carbon, alloy and stainless steel. Send coupon for more information.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
Dept. C-2829 R.
3106 East 45th Street
Cleveland 27, Ohio

☐ Have an Alloy Steel Metallurgist call.

Send more information on:
☐ Stampings (Booklet Adv. 681) ☐ Iron Powder (Booklet Adv. 763)
☐ Special Sections

Name_____ Title_____
Company_____
Address_____
City_____ Zone____ State_____

(*Continued from page* 128)

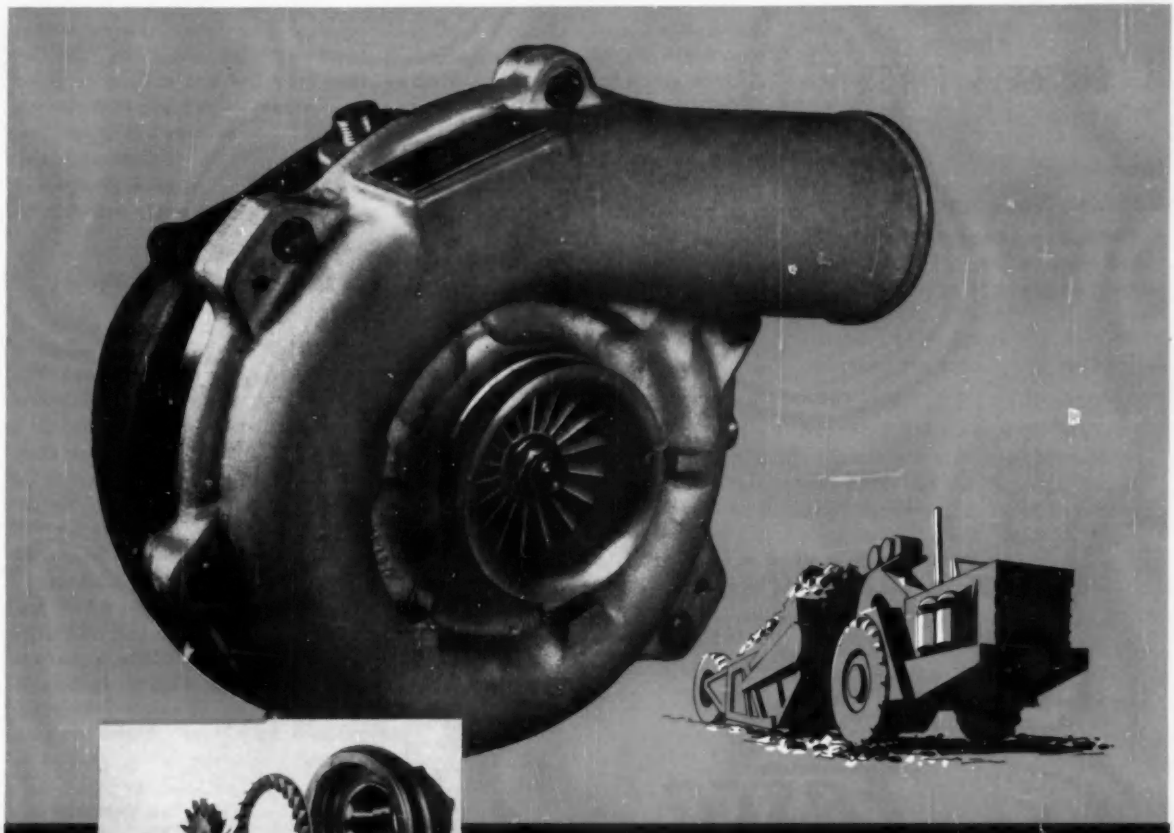
Government officials are now laying the groundwork for a hurry-up program of translating foreign scientific reports and journals, particularly those received from Russia, for Government as well as private and industrial scientists. Massive piles of these reports and magazines are for the most part laying unused in the Library of Congress. In only a few instances are these publications translated. Many of the Russian publications carried detailed technical articles on the sputniks and the Red missile program in general long before the firings.

Army now has about 20,000 civilian scientists and engineers. Of these, about 11,000 are assigned to rocket and missile work.

Washington says industry's demands for atomic construction permits are growing steadily. Thus far, Atomic Energy Commission access permits have been issued to 1,145 firms in about 40 industry groups. Probable savings to industry as a result of use of radioisotopes are around $400 million a year, AEC estimates.

Secretary of Labor James P. Mitchell has made clear that the Eisenhower Administration will not be drawn into any controversy over automobile prices. He flatly says that it will not meddle in determining whether prices of 1958 models are too high, too low, or just right.

A group of more than 30 firms, mostly subcontractors in the budding missile and rocket industry, are forming their own trade association. Shift in military procurement from planes to missiles, and resulting possible reductions in the amount of subcontracting, is partly responsible. New group is tentatively called the National Rocket and Missile Industry Association. Headquarters will probably be in Washington, D. C.



NEW! Rugged Turbine Design Means Less Maintenance with Thompson Turbochargers

Turbine parts on new Thompson Turbochargers are crack- and corrosion-free, thanks to use of a heat-resistant alloy and close attention to design! Built to withstand turbine inlet temperatures of over 1500 degrees, the Thompson turbine is designed to deliver a minimum of 10,000 hours of trouble-free service. Studs have been eliminated from this high temperature section for easier installation and longer life.

You'll find other advanced features in the bearing and compressor sections of new Thompson Turbochargers. Careful location of simple, one-piece bearing has resulted in high critical speeds at smaller shaft diameters. Straight rotor vanes simplify compressor design, maintain highest efficiencies at lower rotor speeds.

Let our engineers show you how you can economically increase the horsepower of your diesel engines up to 100%. New Thompson Turbochargers are available in sizes to efficiently blow diesels from 50 to 300 horsepower.

Write on your company letterhead for Booklet AI-1257, containing detailed information on Thompson Turbochargers.

JET DIVISION

Thompson Products, Inc.

Cleveland 17, Ohio

The BUSINESS PULSE

(*Continued from page* 96)

Increased Defense Spending

There also seems to be special significance in the fact that the reduction in discount rates came the day after President Eisenhower made his Oklahoma City speech, intimating that a very considerable increase in future defense spending was necessary to meet the heightened Soviet challenge. "By whatever amount savings [in other categories of Government spending] fail to equal the additional costs of security," said the President, "our total expenditures will go up. Our people . . . will not sacrifice security to worship a balanced budget." These comments obviously have possible inflationary implications and might have been expected to make Federal Reserve officials even more reluctant than before to relax restraints. The fact that they did not indicate a belief on the part of officials that the impact of an enlarged defense program, both in dollars-and-cents terms and in a psychological sense, is likely to be gradual rather than immediate.

Effects of Credit Policy Reversed

What is likely to be the effect of the reversal of credit policy? Will it halt the downtrend of business and stimulate new expansion, or is the need for correction so deep-rooted as to make the economy insensitive to easier money? No one knows, of course, for there are still too many imponderables. Most businessmen seem to be adopting a "wait-and-see" attitude, which may well carry over into the new year.

The outcome is likely to turn as much on psychological factors as anything else. If easier money and plans for a bigger defense program should create the expectation of renewed inflation, the spending inclinations of both businessmen and consumers could be accentuated, causing the present recessionary phase to be mild and of short duration. If this should not happen, the economy could very well undergo a major test in the first half of next year. In that case it should be possible to judge with some degree of assurance whether there is validity in the sometimes expressed fear that significant distortions exist today because of the many unusual stimuli which have operated in the economy during recent years.

The further we get into 1958, the greater is likely to be the practical stimulating influence of larger defense expenditures. But whether higher defense outlays will prove an adequate offset to possible weaknesses elsewhere remains to be seen. In part, this will depend on the magnitude of the rise in military spending and on how increases are financed, but such matters as these will not be clarified until after Congress reconvenes, if then.

THE SKY TUBE THAT STAYS HOT ON A HEAT "SCENT"

In the skies today flies a new series of deadly, pilotless rockets...lethal in their sting, unerring in their flight. Infrared control solved the major problem of guidance but mass production of the rocket with economy was still a difficult assignment. Here, Hunter Douglas aluminum cold forgings proved uniquely successful.

This process achieves fast, economical production of tubular shapes with a variety of internal and external structural details integral with the tube itself. Costly fabrication and time-wasting assemblies are eliminated. The resulting tubes are *stronger, simpler, cheaper, more accurate* and *more efficient!* Combine these advantages with *straightness, roundness* and *true diameter* from end to end and you'll see why Hunter Douglas is the recognized source for cold forged tubular components from coast to coast.

If your contract includes tubular or hollow shapes—with or without closed ends—get the facts on Hunter Douglas Aluminum Cold Forgings. A letter will bring recommendations.

ANOTHER HUNTER DOUGLAS "FIRST"—*Newest member of the special metals family to undergo successful cold forging at Hunter Douglas is Molybdenum—now produced experimentally in precision tubes of nominal length. Not a standard production item; cost necessarily restricts Moly tubes to vital projects, at present.*

*SIDEWINDER:
Designed by Naval Ordnance Test Station, China Lake, California. Aluminum rocket motor mass produced by Hunter Douglas Aluminum, Riverside, California.

Hunter Douglas Aluminum Division of Bridgeport Brass Company • Dept. AI-12, Riverside California • OVerland 3-3030

Johnson Motors Will Include V-4 Engine in Its 1958 Line

Johnson Motors Div. of Outboard Marine will introduce a V-4, 50 hp engine in its 1958 line of outboard motors. The 70.7 cu. in. displacement engine features a twin barreled, downdraft carburetor and a thermostatically controlled recirculating water cooling system. Johnson will offer other motors ranging from three to 35 hp in addition to the new V-4.

AIRBRIEFS

(*Continued from page* 98)

seconds. The hydraulic motors act as brakes by reversing the fluid flow.

Business Plane Flies Transpolar Route

A standard production model twin-engine Learstar was recently flown 6000 miles from Santa Monica, Calif., to Germany over the transpolar route. The first leg of the flight, 3055 miles to Frobisher Bay, was made in 11 hours, 14 minutes. The total elapsed time from California to Dusseldorf Airport was 23 hours and 58 minutes.

This was the first flight made by a twin-engine aircraft over the transpolar route. The Learstar made what is referred to as a routine delivery flight from the builder's plant, Pacific Airmotive Corp., to Helmut Horten, German department store chain operators. Most of the 6000 mile trip was made on autopilot, a Lear L-102.

Atlas Missile

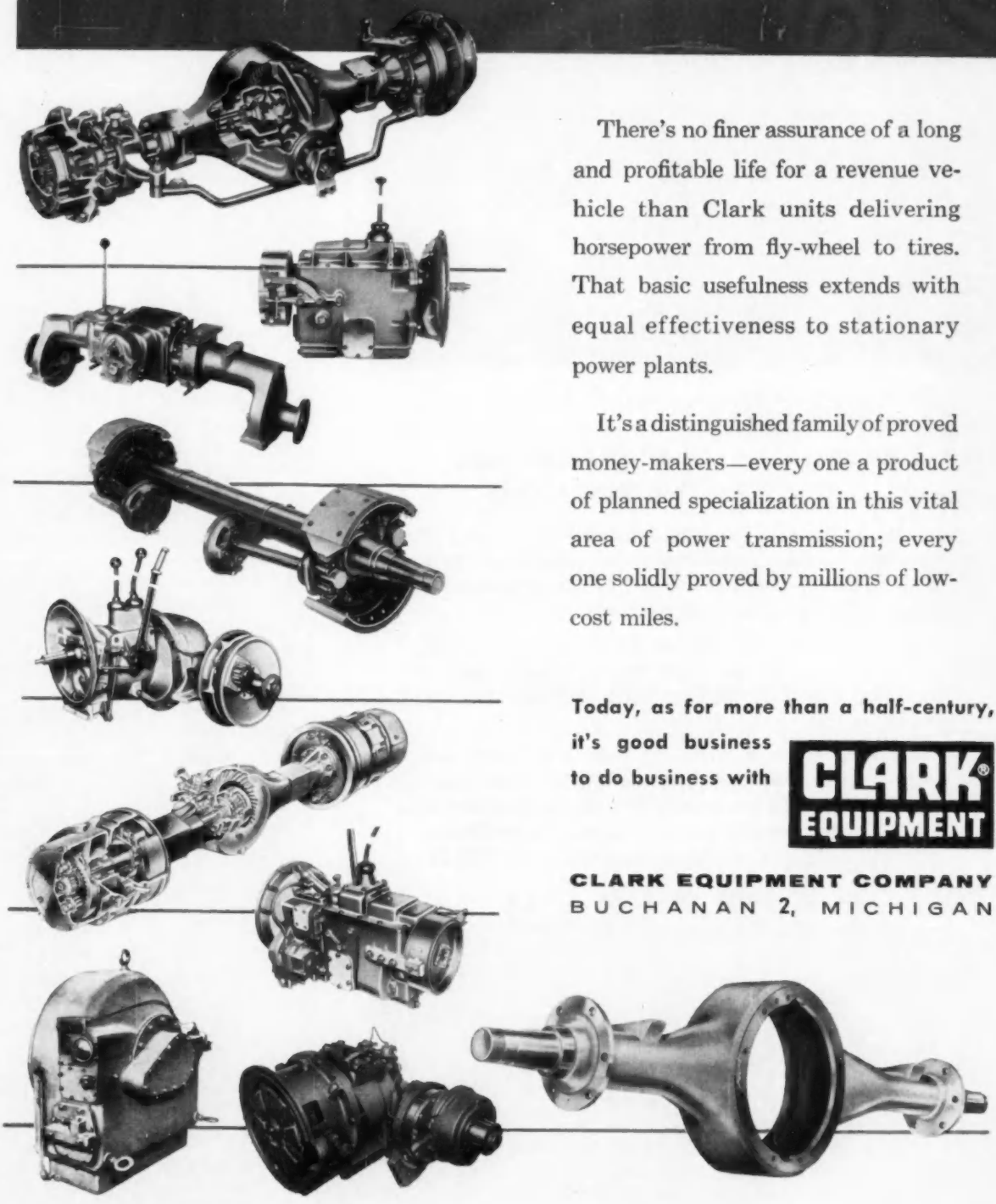
America's first intercontinental ballistic missile, the SM-65 Atlas, is in pilot production by Convair-Astronautics at its San Diego plant. This missile is powered by liquid propellants, oxygen and hydrocarbons, in a rocket type engine and is designed to deliver a thermonuclear warhead at intercontinental ranges.

An early full scale test of the Atlas Missile is expected to take place early in December.

Two unsuccessful firings have been made to date.

Considerable ground testing has

From fly-wheel to drive-wheel
. . . let it be CLARK



There's no finer assurance of a long and profitable life for a revenue vehicle than Clark units delivering horsepower from fly-wheel to tires. That basic usefulness extends with equal effectiveness to stationary power plants.

It's a distinguished family of proved money-makers—every one a product of planned specialization in this vital area of power transmission; every one solidly proved by millions of low-cost miles.

Today, as for more than a half-century, it's good business to do business with

CLARK® EQUIPMENT

CLARK EQUIPMENT COMPANY
BUCHANAN 2, MICHIGAN

AIRBRIEFS

(*Continued from page* 140)

been accomplished at Sycamore Canyon, near San Diego, and at Edwards Rocket Base. A full-scale ground test of a missile takes 10 hours or more and culminates in a minute or two of rocket engine firing.

Some 1900 wires connect the heavily instrumented missile to control panels and recorders.

Associates working with Convair include: Rocketdyne Division of North American Aviation; General Electric Co.; Burroughs Corp.; and American Machine and Foundry Co.

Research and development phases of Project Atlas are directed by the Air Force Ballistic Missile Division, ARDC, commanded by Maj. Gen. Bernard A. Schriever.

Collier Trophy Award

Charles J. McCarthy, Chairman of the Board, and his associates at Chance Vought Aircraft and Vice Admiral James S. Russell, USN and his associates at the U. S. Navy Bureau of Aeronautics, have been chosen joint recipients of the Collier Trophy Award for 1956.

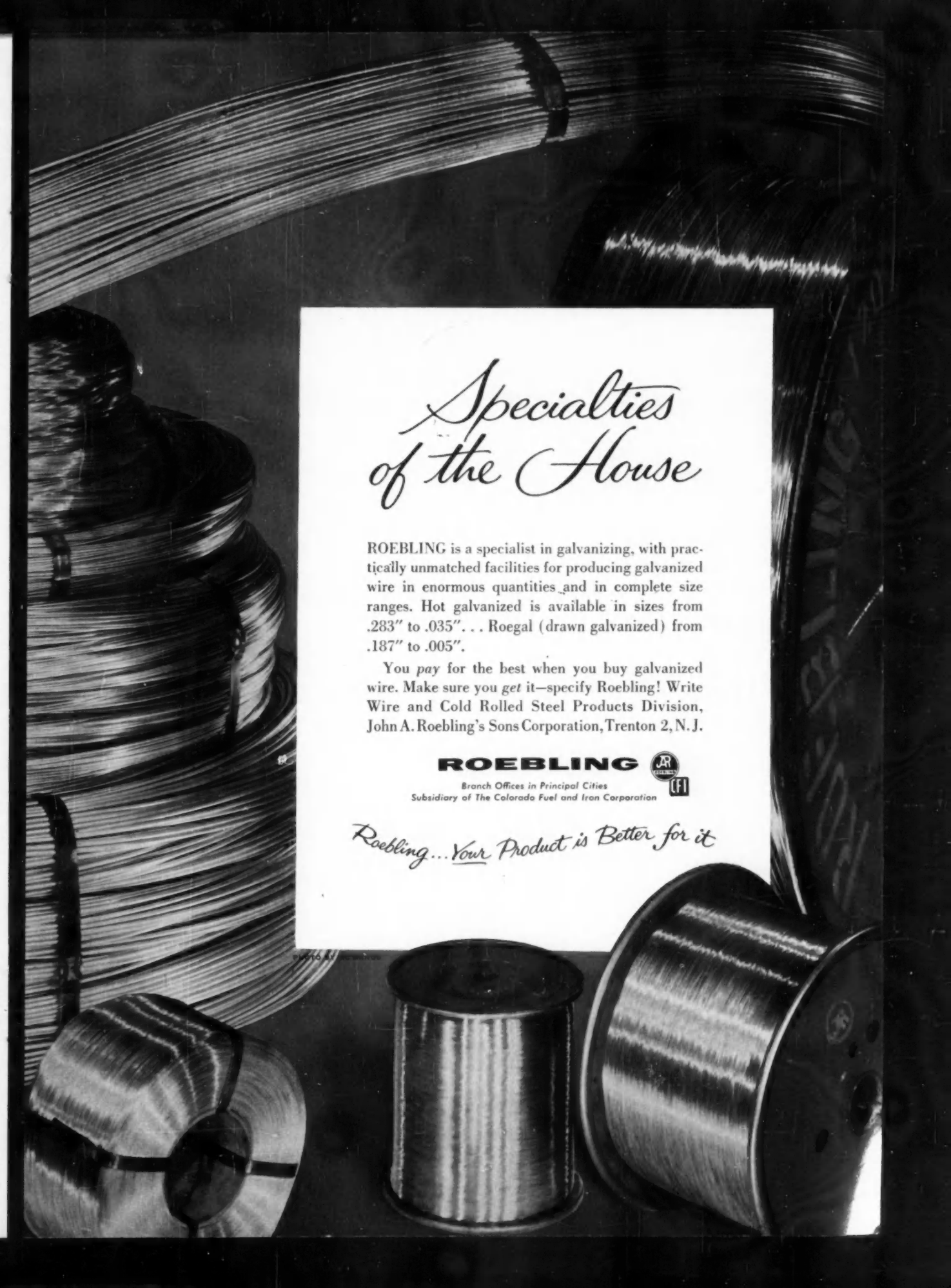
The award is being presented for the conception, design and development of the Navy jet fighter plane, the F8U Crusader.

This is the first operational carrier-based fighter aircraft capable of speeds exceeding 1000 mph.

Announcement of the award was made by Thomas G. Lanphier, Jr., president of the National Aeronautic Association. The Collier Trophy awarded annually by the NAA and sponsored by *Look Magazine,* is presented each year for "the greatest achievement in aviation in America, the value of which has been demonstrated by actual use during the preceding year." Presentation of the award will take place at the Wright Brothers Memorial Dinner, conducted annually by the Aero Club of Washington, at Washington, D. C. on December 17.

Brewer Trophy Award

Edwin A. Link, inventor of the Link Trainer and other aviation



Specialties of the House

ROEBLING is a specialist in galvanizing, with practically unmatched facilities for producing galvanized wire in enormous quantities and in complete size ranges. Hot galvanized is available in sizes from .283″ to .035″. . . Roegal (drawn galvanized) from .187″ to .005″.

You *pay* for the best when you buy galvanized wire. Make sure you *get* it—specify Roebling! Write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, N. J.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it

Eastman

First to be specified by America's leading OEM's

It's a known fact that many leading Original Equipment Manufacturers submit their original specifications for their *first* quotation to Eastman.

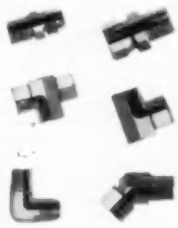
EASTMAN's unequalled experience in hydraulic conversion, plus many original designs shown in a few popular Eastman fittings at the right—give your product an appearance of quality that improves its competitive position in your field. It's a mark of distinction to be Eastman equipped!

EASTMAN Engineering Service . . . Backed by Unequalled Experience

It is also a known fact that Eastman's co-operative engineering counsel and service is highly respected and often requested by leading OEM's. Let Eastman engineers help you lay out your fluid power lines—from pump to point of work—effecting economies in design, improving performance and increasing user satisfaction.

Let EASTMAN recommend the *best assembly . . . for the best performance . . . at the lowest cost.*

Bent Tubing with the necessary fittings to meet your own specific requirements.



Adapters, Adapter Unions and Boss "O" Ring Fittings. All types and sizes available.

A COMPLETE LINE OF HYDRAULIC FITTINGS and HOSE ASSEMBLIES . . .

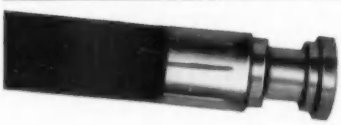
Permanently Attached Male (NPTF) for 1, 2 and 3 wire braid rubber cover hose, and 4 spiral wire extra high pressure hose.
Sizes: 3/16" thru 3".
Wkg. pressure: 375—5000 p.s.i.

Permanently Attached Male Flare (JIC) for 1, 2 and 3 wire braid rubber cover hose.
Sizes: 3/16" thru 2".
Wkg. pressure: 375—5000 p.s.i.

Permanently Attached Swivel Female for 1, 2 and 3 wire braid rubber cover hose.
Sizes: 3/16" thru 2".
Wkg. pressure: 375—5000 p.s.i.

Reusable Male (NPTF) for rubber and cotton cover hose.
Sizes: 3/16" thru 1 3/16".
Wkg. pressure: 375—5000 p.s.i.

Reusable Swivel Female for rubber and cotton cover hose.
Sizes: 3/16" thru 1 3/16".
Wkg. pressure: 375—5000 p.s.i.



Permanently Attached Flanged Head Couplings for 1 and 2 wire braid rubber cover hose.
Sizes: 1/4" thru 2".
Wkg. pressure: 375—5000 p.s.i.

Clamp Type Coupling with split flange stems for 1 and 2 wire braid rubber cover hose.
Sizes: 1/4" thru 2".
Wkg. pressure: 375—5000 p.s.i.

Power Steering Assemblies to meet all your requirements.

Eastman *first in the field*

MANUFACTURING COMPANY
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ENGINEERS:
Write for Technical Bulletin 200 for Complete Information and Data on Fluid Power Lines.

DANA ENDURANCE that is characteristic . . .

ENDURANCE that is characteristic of all Spicer products

This is a true story, as published in TRUE, the Man's Magazine.

"Strike at Seventymile!" exclaimed Fred Schroder's partner, bursting into their cabin in Dawson, Yukon Territory, in March, 1897.

"I'll start in the morning," replied Schroder. 37 years old, 5 feet 7 inches, 160 pounds. It was 15 below when he left in the black pre-dawn. Rambling on at a steady 6 to 7 mile an hour pace, he passed Fortymile at midday, 52 miles from Dawson.

Through the afternoon and into the spectacular Arctic night he mushed without stopping . . . feet, legs, lungs and heart working steadily, automatically. He had reached that condition of equilibrium when the human system becomes a perfectly functioning engine.

At midnight the cabin lights at Seventymile broke through the trees. Schroder had trekked 120 miles on foot in the astonishing time of 19 hours . . . a superhuman feat of endurance!

Painting by Fred Ludekens, courtesy TRUE, The Man's Magazine. Copyright 1955, Fawcett Publications, Inc.

Millions and millions of automotive vehicles, airplanes, ships, trains and other types of equipment have proved the stamina of Spicer equipment, in billions of miles and service hours throughout the world.

Endurance is an inbuilt feature of all Spicer products. With 10 modern plants doing much of their processing from raw material to finished product . . . with engineering genius and manufacturing skill of the highest order . . . Dana Corporation controls and maintains quality standards that have made Spicer Products "Standard of the Industry."

DANA CORPORATION, Toledo 1, Ohio

DANA PRODUCTS Serve Many Fields:

AUTOMOTIVE: Transmissions, Universal Joints, Propeller Shafts, Axles, Powr-Lok Differentials, Torque Converters, Gear Boxes, Power Take-Offs, Power Take-Off Joints, Clutches, Frames, Forgings, Stampings.

INDUSTRIAL VEHICLES AND EQUIPMENT: Transmissions, Universal Joints, Propeller Shafts, Axles, Gear Boxes, Clutches, Forgings, Stampings.

AVIATION: Universal Joints, Propeller Shafts, Axles, Gears, Forgings, Stampings.

RAILROAD: Transmissions, Universal Joints, Propeller Shafts, Generator Drives, Rail Car Drives, Pressed Steel Parts, Traction Motor Drives, Forgings, Stampings.

AGRICULTURE: Universal Joints, Propeller Shafts, Axles, Power Take-Offs, Power Take-Off Joints, Clutches, Forgings, Stampings.

MARINE: Universal Joints, Propeller Shafts, Gear Boxes, Forgings, Stampings.

Many of these products manufactured in Canada by Hayes Steel Products Limited, Merritton, Ontario

DANA
Spicer

AIRBRIEFS

(*Continued from page* 142)

training devices, has been designated to receive the 1957 Frank G. Brewer Trophy Award.

This award is presented for the advancement of aviation education and will be presented to Mr. Link with the accompanying citation: "To Edwin A. Link, whose inventive genius has resulted in the development of simulators and other devices which directly contributed to the education of hundreds of thousands of aviators and whose unselfish dedication to aviation education resulted in his establishing and liberally endowing The Link Foundation, which will provide for years to come financial support for students and research in the field of aviation education and training."

The Brewer Award will be presented by the National Aeronautic Association at the Wright Brothers Memorial Dinner in Washington, D. C. on December 17.

Liquid Engine for ICBM

The Aerojet-General Corp., a subsidiary of The General Tire and Rubber Co., Sacramento, Calif., has been awarded a $55,650,000 contract for propulsion units for the Titan intercontinental ballistic missile.

These engine components for the Titan missile are being built in Aerojet's new $10 million metal parts manufacturing plant erected last year under an Air Force contract. The plant contains 308,000 sq ft of manufacturing area and 40,000 sq ft for administrative uses. Following tests of the liquid engines, they will be delivered to the Denver plant of the Martin Co., prime contractor for the Titan missile.

Aircraft Industry Employment

Total employment in the aircraft industry has dropped from 902,000 in July (when the Government's economy drive was launched) to 884,700 at the end of August. This represents a reduction of 17,300

workers; 10,400 of these from the ranks of production workers and 6900 furloughed from office and technical work.

Reduction of overtime allowances had increased the average weekly wage rate from $99.12 in April to $94.60 in May. In spite of the decline in overtime, average hourly earnings are increasing. Including overtime premiums, average hourly earnings have increased from $2.33 in May to $2.37 in August.

Listing of 38 Missiles

President Eisenhower's first speech to the nation on "Science in National Security" last month mentioned 38 types of guided missiles "either in operation or under development." Nearly a third, he said, are in service.

So far as can be ascertained, these are the previously identified missiles the President may have had in mind:

Surface-to-air (9) — Nike-Ajax, Nike-Hercules, Nike-Zeus, Terrier, Tartar, Talos, Talos-L, Hawk and Bomarc.

Air-to-air (6)—Falcon I, Falcon II, Sparrow I, Sparrow III, Genie and Sidewinder.

Air-to-surface (5)—Petrel, Rascal, Bullpup, Corvus and an unnamed missile for which a development contract was recently awarded to North American Aviation.

Surface-to-surface (18)—Honest John, Little John, Corporal, Regulus I, Regulus II, Matador, Sergeant, Dart, Lacrosse, Goose, Duck, Snark, Redstone, Polaris, Thor, Jupiter, Atlas and Titan.

More Speed for DC-3's

Veteran Douglas DC-3 airplanes are now flying faster with the assistance of a "Maximizer Kit." Installation of this kit is said to guarantee a 20 mph increase in the cruising speed of a DC-3 with no added horsepower.

The Maximizer Kit, developed by the AiResearch Aviation Service Division at Los Angeles International Airport, includes a streamlining operation especially on the engine cowling, engine baffles, oil cooler ducting, wheel-well doors and exhaust system.

Newest Aviation Outpost

An aviation facility, Frobisher Bay located on Baffin Island, provides an ideal refueling spot for over the Arctic air transport operations.

Frobisher Bay is located latitude 63°45′, longitude 68°35′ and is just 200 miles from the Arctic Circle and 1200 miles north of Montreal. This aviation facility is becoming a major international airport. In airline mileage, it is almost halfway between San Francisco and Paris.

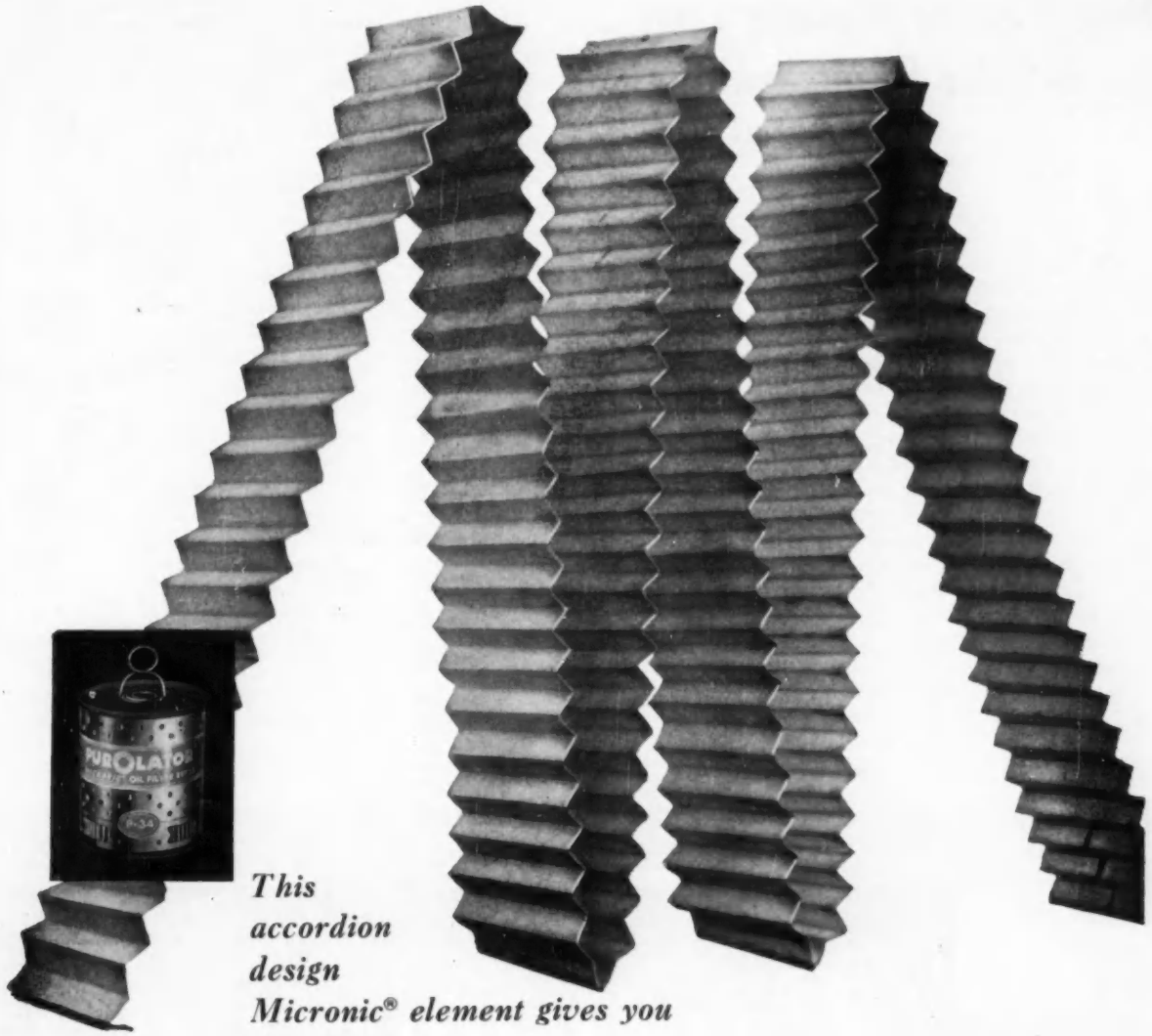
Transpolar service makes Europe only 19 hours from the West Coast cities. Pan American runs four round trips per week from San Francisco, Los Angeles, Seattle and Portland. Trans World Airlines and Canadian Pacific also stop at Frobisher for refueling.

Fueling facilities installed by Shell Oil Company include a 3,360,000 gallon storage tank. The tank was installed at a cost of $320,000, almost four times the usual cost of such a job. The tank holds enough gasoline to fuel the planes for 10 months, while ice closes the harbor for shipping.

Wright Brothers Lecture

"Hypersonic Flight and the Re-Entry Problem" is the subject of the annual Wright Brothers Lecture which will be given on December 17 at the Natural History Building, Smithsonian Institution, Washington, D. C.

The author, H. Julian Allen, is chief of the High Speed Research Division at the Ames Aeronautical Laboratory of the National Advisory Committee for Aeronautics. Mr. Allen is credited with the discovery of blunting a missile's nose cone, a design feature to keep missile temperatures within acceptable limits during the missile's return flight through the earth's atmosphere.



This accordion design Micronic® element gives you

10 times more filtration area for full engine protection

Pull out Purolator's accordion design and you'll see how Purolator packs 10 times more filtration area into its element than most filters. You'll find it provides maximum filtering area in minimum space, assuring *full* engine protection as no other filter does.

Controlled porosity of Purolator's Micronic® element filters out particles as small as .000039 of an inch, yet never removes costly additives in heavy-duty or detergent oils and never channels. The Micronic® element, made of plastic-impregnated cellulose, isn't affected by engine temperature, crankcase dilution, or water.

Engine manufacturers have proved time and time again that these wear-reducing features make an engine perform better and last longer. Find out how they can do the same job for you. Write for our new 32-page "Filtration Manual for Product Designers"—and please enclose 25¢ to cover postage and handling. Address Dept. A4-1216.

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

Rahway, New Jersey and Toronto, Ontario, Canada

New Transfer Machine Lines for Cylinder Heads and Blocks AT CADILLAC

(*Continued from page* 72)

The next operation is quite complicated, involving the numerous stages of rough and semi-finish-milling of the combustion chambers. Not only are these operations performed in individual steps but they are done on only two combustion chambers of each head at one time. This explains why it is necessary to have a 20-station Foot-Burt milling machine for the purpose. At the last station the heads are moved into a power transfer station which directs them to the next transfer machine.

Here we have a real work-horse transfer machine — a 30-station Greenlee. At the various stations it handles the following summary of operations: drill 17 mounting holes; chamfer and tap four rocker cover holes; drill, ream, chamfer and tap four spark plug holes on both sides; drill eight valve guide bushing holes; rough-counterbore eight spring pockets; countersink and tap for Dryseal pipe plugs; drill seven water circulation holes; drill one oil gallery oil. At station 9 spark plug holes and a water circulation hole are flushed and probed. At station 17 the work is tilted 17 deg to present the valve holes to the horizontal heads. At station 27 the fixture dumps the chips and turns the part 107-deg. unloading it at station 29.

Heads now enter an 11-station Greenlee transfer machine which handles the drilling, chamfering, and tapping of six exhaust face holes; drilling, chamfering and tapping of four intake face holes; drilling and reaming of one locating hole. After drilling, the work is flushed and all holes in exhaust and intake faces are probed in preparation for tapping at station 8. At station 9 the parts are rotated 90 deg and unloaded.

For the record we wish to repeat that each of the transfer machines handles two heads at a time. The next operation is the drilling and tapping of all holes in the ends, including welch plug holes. This is done in a seven-station special Footburt transfer machine. Here, too, there are probing stations in the line ahead of tapping.

From the Footburt unit the heads proceed on a power transfer unit to a succession of two important corrective operations. The first of these is the finish-milling of cover rails and exhaust pad face in a four-station Kearney & Trecker

milling machine. Then power transfer to another four-station K & T mill for the finish-milling of the gasket face and intake manifold pads. Consequently, the surfaces originally surface-broached now are finish-milled after the bulk of heavy machining operations have been completed.

The heads now enter a 12-station Footburt milling machine for finish-milling of combustion chambers. This marks the third major sequence on combustion chambers assuring dimensional accuracy, fine surface finish, and accuracy of combustion chamber volume.

Heads leave the machine and enter a Centri-Spray washer, preparatory to operations in the 26-station Greenlee transfer machine—the next in line. This machine finishes the valve guide bushing holes; finish-counterbores above the valve seats; finishes the valve seats and valve throat hole below the valve seat; finish-counterbore the spring seats; blows out and sprays valve holes; presses-in the valve guide bushings; pressure checks each bushing; finish-bores the valve guide bushings. In addition, it drills, probes, and taps the thermo plug hole in the left hand head.

At station 25 the heads are rotated 73-deg and unloaded at station 26 to go through a Centri-Spray washer. Next follows the pressing-in of welch plugs, then complete inspection and air testing. This is followed by the assembly of valves, seals, valve springs, valve seats and keepers. Following assembly, the heads are placed in pairs on the conveyor for transport to engine assembly.

It may be noted that in the interest of space saving the cylinder head machine line, described above, is installed in the form of a U with a power transfer conveyor bridging the two parallel arms. It is noteworthy too that Cadillac found it desirable to use cutting fluids on all operations except the initial broaching and milling, and finish-milling operations marking an important departure from previous practice on cast iron.

The entire line is serviced by a chip conveyor in a trench in the floor and chips are removed from the trench by means of elevators located at regular intervals, dumping into hoppers.

The Greenlee transfer machine, described above, employs the gun drilling technique for the valve guide holes. Accuracy of uncommon order is expected of this machine. For example, the concentricity of the valve seat, with respect to the valve guide bore, is held to a tolerance of 0.0005 in., indicator reading.

There is an interesting feature in respect to the machining of cylinder heads. We noted above the operations in the 7-station Footburt transfer machine. Up to that stage of the cycle all cylinder heads were identical. In this machine, however, the heads are converted into sets of right- and left-hand by certain differences in machining. And from this point on the heads continue in pairs.

SHORTIES

Gasoline consumption in the U. S. exceeded 56 billion gal in 1956.

•

If the Administration's proposed budget of $71.8 billion were enacted, the Federal Government would spend: $5,983,916,667 per month; $1,380,903,846 per week; $196,731,506 per day; $8,197,147 per hour; $136,619 per minute; and $2279 per second.

•

Wind tunnel testing time for a modern jet bomber amounted to 8000 hours—33 times more than the tunnel hours required for a World War II bomber.

•

Total government tax receipts in the U. S. are, for the first time in the country's history, reaching the $100 billion mark. This sum equals $1900 for each American family.

•

A missile guidance unit, placed on top the Washington monument, could detect the vibrations caused by a baby entering the ground door.

•

A single thumbprint on a gyroscope part will throw the system out of balance, causing operational inaccuracies.

•

Talcum powder is used to test the ventilation system of a modern airliner so that engineers can see the air currents.

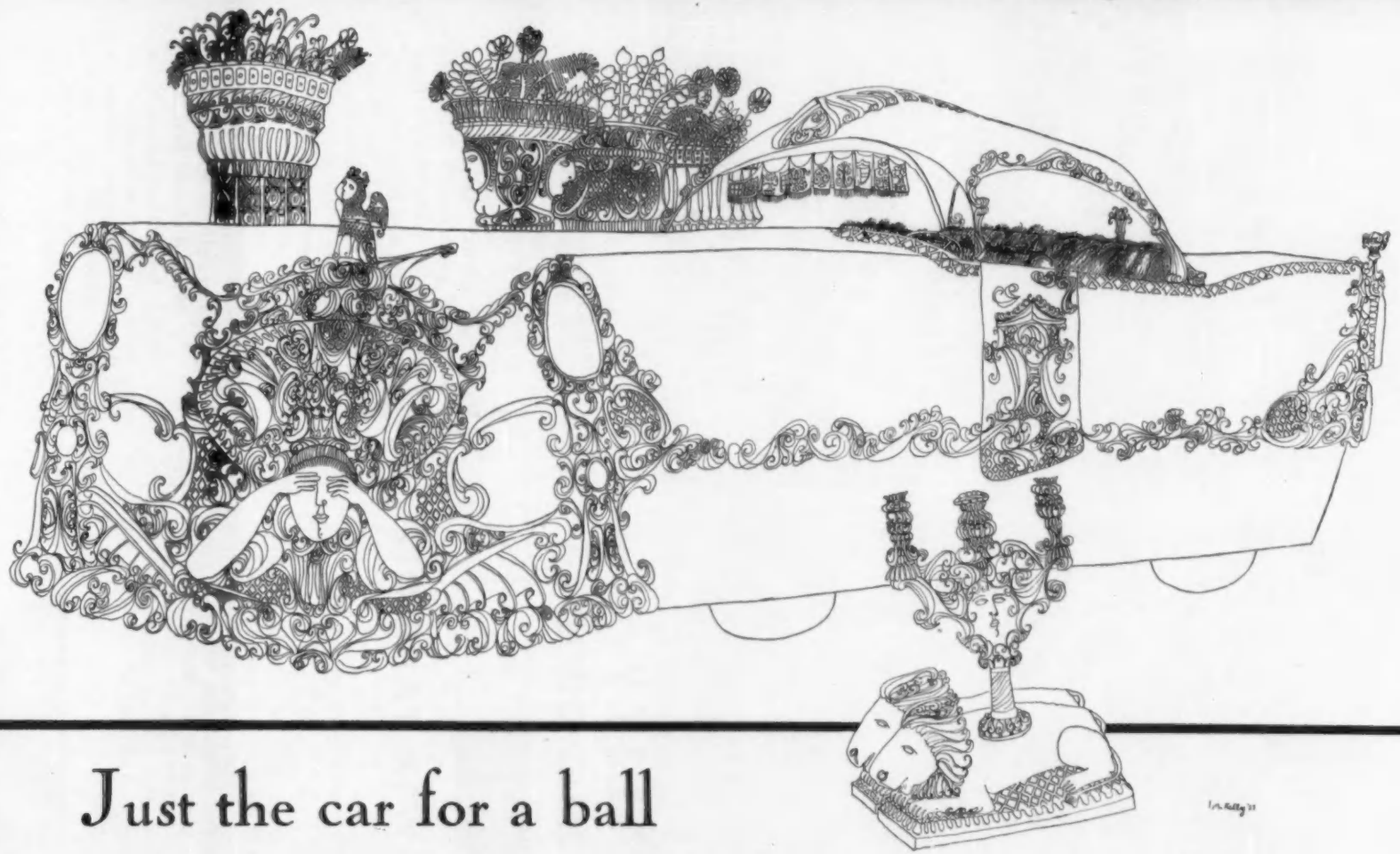
•

The average $4500-a-year man today must work two hours and 26 min of his eight-hour day to pay for his taxes.

•

The proposed fiscal 1958 Federal budget, $72 billion, is just slightly more than total Federal spending for the first 132 years of the nation's life. A calculated, total spending from 1789 to and including 1921 amounted to $71.5 billion.

USS STAINLESS STEEL



Just the car for a ball

Those who design for the public taste sometimes feel that the above vehicle is what people want to ride in on that big night out . . . with ermine, top hats, tiaras and gold-knobbed canes.

The limousine is phantasy, of course, but there's nothing chimerical about the tasteful, gleaming Stainless Steel you see on *all* cars. Stainless trim is as durable and practical as anything can be. It resists denting and corrosion far better than any other metal, retains its luster indefinitely. Remember, too, that Stainless trim is often cheaper to fabricate than plated parts.

United States Steel sells just about any kind of Stainless you would ever want. But if instead of buying something, you'd like a free gift, write for a jumbo reproduction of the filigreed phaeton shown above. Address United States Steel, Room 2801, 525 William Penn Place, Pittsburgh 30, Pa.

Drawing by Marie Tuicillo Kelly.
Reproductions available on request.

Trends in the CONSTRUCTION EQUIPMENT INDUSTRY

(*Continued from page* 65)

and photogrammetric measurements, combined with the use of computers to speed calculations. The second, which deals with such personal factors as attachment to an old homesite, desire to keep a graveyard intact, fear of loss of business at a bypassed location, and resentment at inconvenience of access to a through highway, is more difficult to overcome. CIMA and cooperating companies have prepared a color-sound film, "We'll Take the High Road," to attempt to demonstrate that the highway locations have been wisely selected, and that they are in the interest of long range welfare for the country as a whole.

Controlled Access to Roads

C. D. Curtiss, Commissioner of Public Roads, speaking at the annual meeting of the American Association of State Highway Officials in Chicago Nov. 18-22, stated, "One of the standards most frequently questioned (in the highway program) is the one requiring control of access. Unless we preserve the future capacity of this national network through fully controlled, carefully planned access, the present terrible carnage occurring on our overcrowded highways will continue and the costly new system on which we count so heavily will not be able to carry the traffic of 1975. As engineers and highway officials we have every reason to believe that with carefully planned entrances and exits the Interstate network can be made the safest, most efficient transportation system ever devised. Without this all-important safeguard the other standards would be quite ineffective. That is why the law itself calls for this design feature."

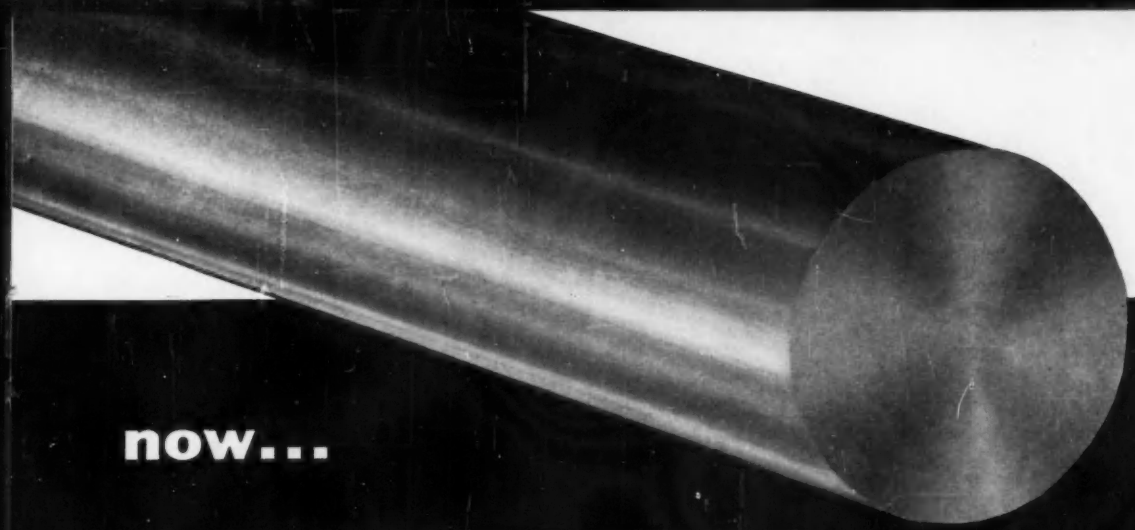
He quoted figures from a still unpublished study of accident costs to show that on two highways of comparable average daily traffic, 28,000 plus, accidents cost an average of $19,000 per year per mile on the controlled access highway as compared with $82,000 on the one without control of access.

The highway program represented a great project in cooperation between Federal and State Governments, said Sen. Albert Gore at the same meeting. He favored adding necessary mileage to the system at the earliest possible time, after it was agreed upon by state and Federal authorities.

Willys Delivers First Mule To 101st Airborne Division

Willys Motors, Inc., has delivered the first production model of the M-274 half-ton weapons carrier to the 101st Airborne Division. Regular shipment of the vehicles, known as the "mechanical mule," will begin this month.

Willys holds contracts of more than $6.7 million for research, engineering, parts and manufacturing of the Mule. The 900 lb four-wheel drive vehicle can carry 1000 lb plus a driver.



now...

we've put COPPER into STRESSPROOF® steel bars

and the pennies you save add up to dollars!

New Copper Controlled Chemistry improves machinability, gives added wear resistance, and resists corrosion

Production increases by as much as 15% to 50% have been achieved in customer tests comparing STRESSPROOF with and without copper.

The controlled addition of copper to the STRESSPROOF chemistry improves machinability, gives added wear resistance, and resists corrosion. In addition, yield strength is guaranteed . . . 100,000 p.s.i. in sizes through 2″ and 90,000 p.s.i. in sizes over 2″—*and* STRESSPROOF requires no heat treating.

JUST PUBLISHED: A new engineering report, "The Effect of Copper, Abnormally Heavy Drafts, Furnace Treatment and Die Practice on STRESSPROOF Steel Bars." Copies are available on request.

La Salle STEEL CO.

1438 150th Street, Hammond, Indiana

MULTIPRESS

boosts carbon core production 33%

at CLEVELAND GRAPHITE BRONZE

Cleveland Graphite Bronze has increased the production of soft carbon cores for aircraft bearing castings by 33% using a 25-ton Denison hydraulic Multipress.

Machining cores to shape, the best alternative method, can be done at the rate of 70-75 per hour. With Multipress, 100 cores are formed in the same period. Soft carbon at one-tenth the cost can be used instead of the hard carbon required in a machining operation.

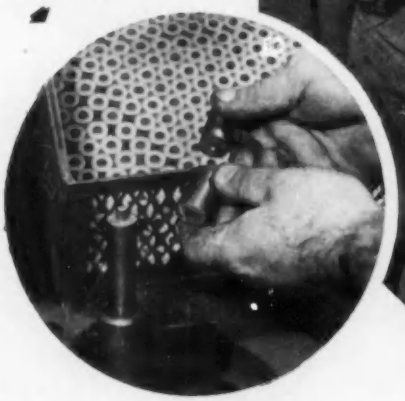
Datalog COM-3 describes this operation in detail.
For your copy, write Denison Engineering Division, American Brake Shoe Co., 1212 Dublin Road, Columbus 16, Ohio.

DENISON HydrOILics

HYDRAULIC PRESSES • PUMPS MOTORS • CONTROLS

Hydraulic ram on 25-ton Multipress descends to press carbon into core form in the first stage of two-part operation.

Plug is removed from soft carbon core after stripping operation at Cleveland Graphite Bronze.



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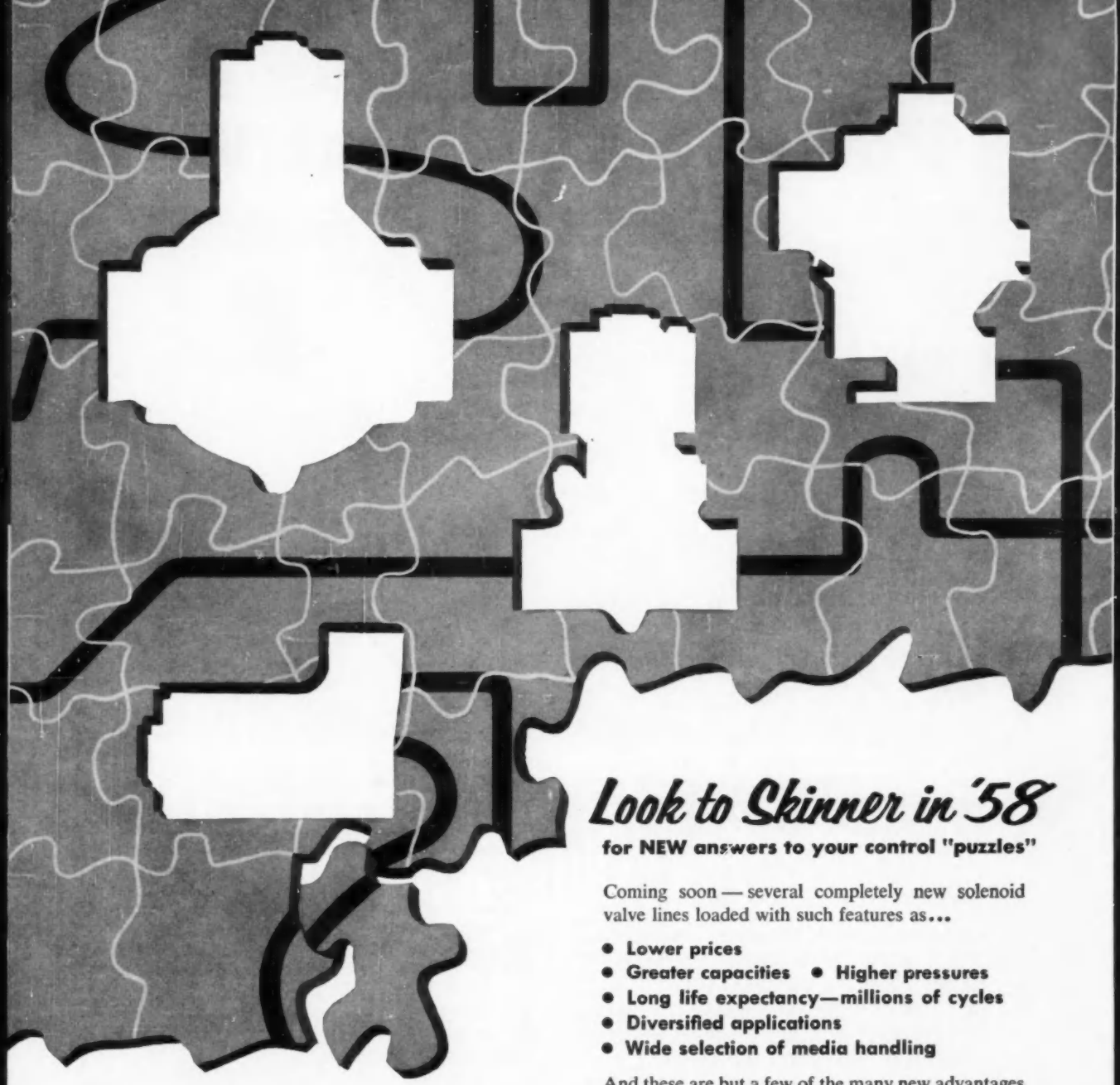


Look to Skinner in '58

for NEW answers to your control "puzzles"

Coming soon — several completely new solenoid valve lines loaded with such features as...

- **Lower prices**
- **Greater capacities** • **Higher pressures**
- **Long life expectancy—millions of cycles**
- **Diversified applications**
- **Wide selection of media handling**

And these are but a few of the many new advantages of Skinner's new solenoid valves. As always, of course, they'll be strictly manufactured to Skinner's highest-quality engineering standards.

Look for the announcements of Skinner's new valve lines in these pages throughout 1958. For advance information, write Dept. 33D.

Most important, these new valves will give you performance and applications that heretofore have not been possible!

SKINNER ELECTRIC VALVES

THE CREST OF QUALITY

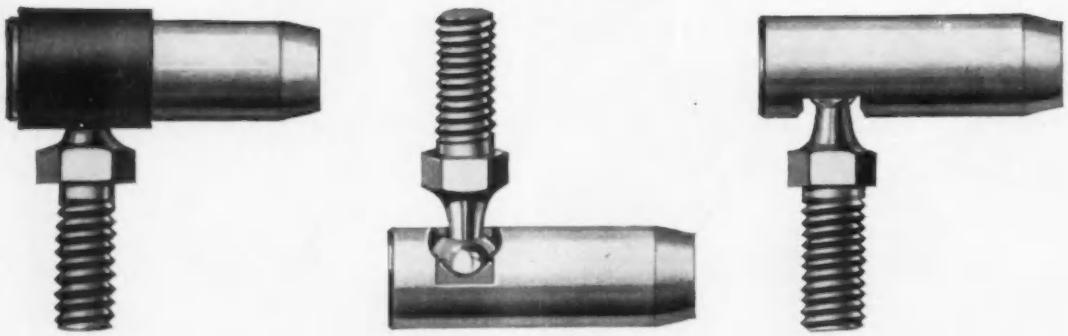
SKINNER ELECTRIC VALVE DIVISION

NEW BRITAIN CONNECTICUT

105 EDGEWOOD AVENUE

Transmit Motion This Positive Low Cost Way!

NEW TOUREK TYPE "F" BALL JOINTS



Where the higher cost of adjustable ball joints has made necessary the substitution of clevises, trunions, bent rods, or other less effective means of transmitting motion, it is now possible to consider the use of Tourek Type "F" Ball Joint, *a low cost trouble-free joint*—carefully, yet simply designed, which can be interchanged with present SAE Standards.

The construction of this Ball Joint is of a non-adjustable type, permitting a minimum 15° movement in any direction.

Ball Screw wear surface is machined into the shell, eliminating the necessity of providing adjustable top caps, cotter pins, sleeves, clips, or other retaining devices. By removal of these parts, a Ball Joint is obtained with no protruding sharp edges and no removable component parts which might become lost. Tampering after installation is minimized and a long wearing, dependable assembly is assured.

This unit is supplied cadmium plated with the ball screw hardened. It may also be obtained prepacked with a lubricant and/or a rubber neoprene dust cover.

Type "F" Ball Joints can presently be supplied to accommodate thread ranges from #10 to ½". If your application requires larger sizes, or variations from our standard specifications, our engineers will gladly propose a Ball Joint for your particular need.

Continued research by our skilled engineering staff assures constantly improved Ball Joint designs. The superiority of TOUREK "STANDARD" Ball Joints results from the accumulated experience of more than thirty seven years of development and low cost mass manufacturing. Ask for the Tourek Ball Joint catalog on company letterhead, please.

Tourek
BALL JOINTS
The Recognized "STANDARD"

J. J. TOUREK MFG. CO.

1901 SOUTH KILBOURN AVENUE, CHICAGO 23, ILLINOIS

World's largest manufacturer of "STANDARD" Ball Joints. Also makers of Pipe Plugs and quality Screw Machine Products. Range: up to 2¾" diameter single and multiple spindle machines. Operations include: Threading • Tapping • Milling • Drilling • Grinding • Polishing • Plating • Heat Treating • Silver Soldering.

ESTABLISHED 1920

THIS LABORATORY TEST of cords taken from test-fleet tires proves that ordinary tire cord loses strength from flexing twice as fast as nylon tire cord . . . proves that nylon cord gives lasting strength for safety and endurance.

IN THE FINAL TEST, the lasting strength of nylon tire cord has been proved in billions of miles of heavy-duty service on trucks. Nylon cord tires are standard equipment on commercial airlines, too.

TEST AFTER TEST PROVES NYLON TIRE CORD GIVES EXTRA STRENGTH FOR EXTRA SAFETY

These influential magazines will carry Du Pont nylon cord tire advertising throughout the year. These ads tell your customers of nylon's lasting ability to shrug off the continual abuse of day-after-day driving and thus offer utmost safety on the highway.

The lasting strength and safety of nylon tire cord have been proved both in the laboratory and on the highway. Nylon cord withstands the added strains of today's more powerful cars and the sustained speed permitted on superhighways. Nylon cord protects against the four major causes of blow-out: heat, moisture, flex fatigue and bruise damage . . . gives motorists added safety and dependability they want in a tire.

Nylon cord tires can reduce unsprung weight, and nylon's shock-absorbing toughness can take the additional strains of power steering, power braking and higher horsepowers. Surveys and rising sales both show that today's motorists know and want the extra strength and safety of nylon cord tires, the tires made to meet modern driving needs.

40% of all passenger-car replacement tires sold are nylon.

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Today, the strongest, safest tires are made with nylon cord

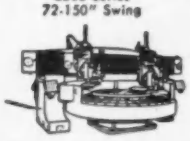
Frauenthal *1200 Series*

☆ single spindle vertical precision grinders

Bird's-eye view of a new Frauenthal 1200 Series (belt-driven) single spindle, vertical precision grinder. These versatile machines are designed to meet a broad range of present requirements . . . are readily adaptable to future requirements.

F **PRECISION PRODUCTION VERSATILITY**

2200 Series
72-150" Swing

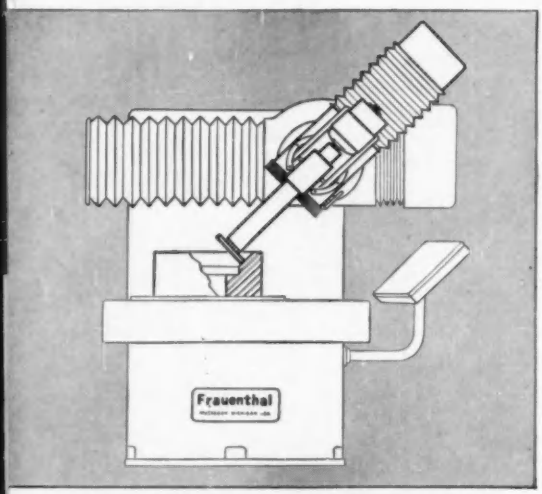


1800 Series
60-72-84" Swing

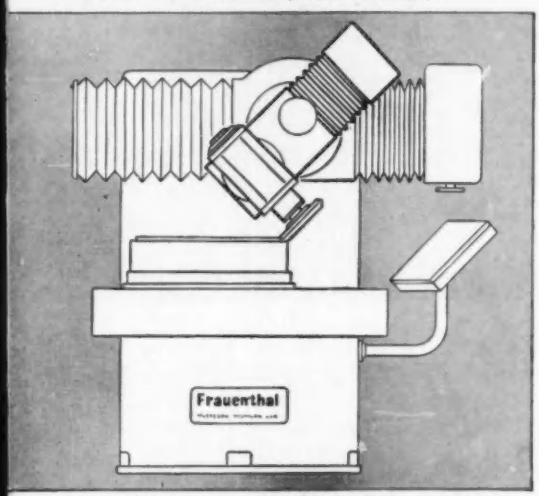
3100 Series
60-72-84" Swing

creatively engineered

...accuracy to .000100" at spindle nose



Frauenthal belt-driven Model 1224B and 1236B single spindle, vertical precision grinders have an extreme angle setting of compound at 45°. Versatility such as this permits angle, internal, external and face grinding to millionths-of-an-inch related tolerances.



Frauenthal direct-connected Models 1224D and 1236D are ideal for rotary surface grinding, O.D. surface and angular approach grinding operations. A variety of grinding spindle positions is possible with this head arrangement.

assures uniform, super-precision part after part!

Super-precision is the natural result of overall Frauenthal single spindle, vertical precision grinder rigidity; of proven performance . . . and *continuous* application of advanced grinding techniques.

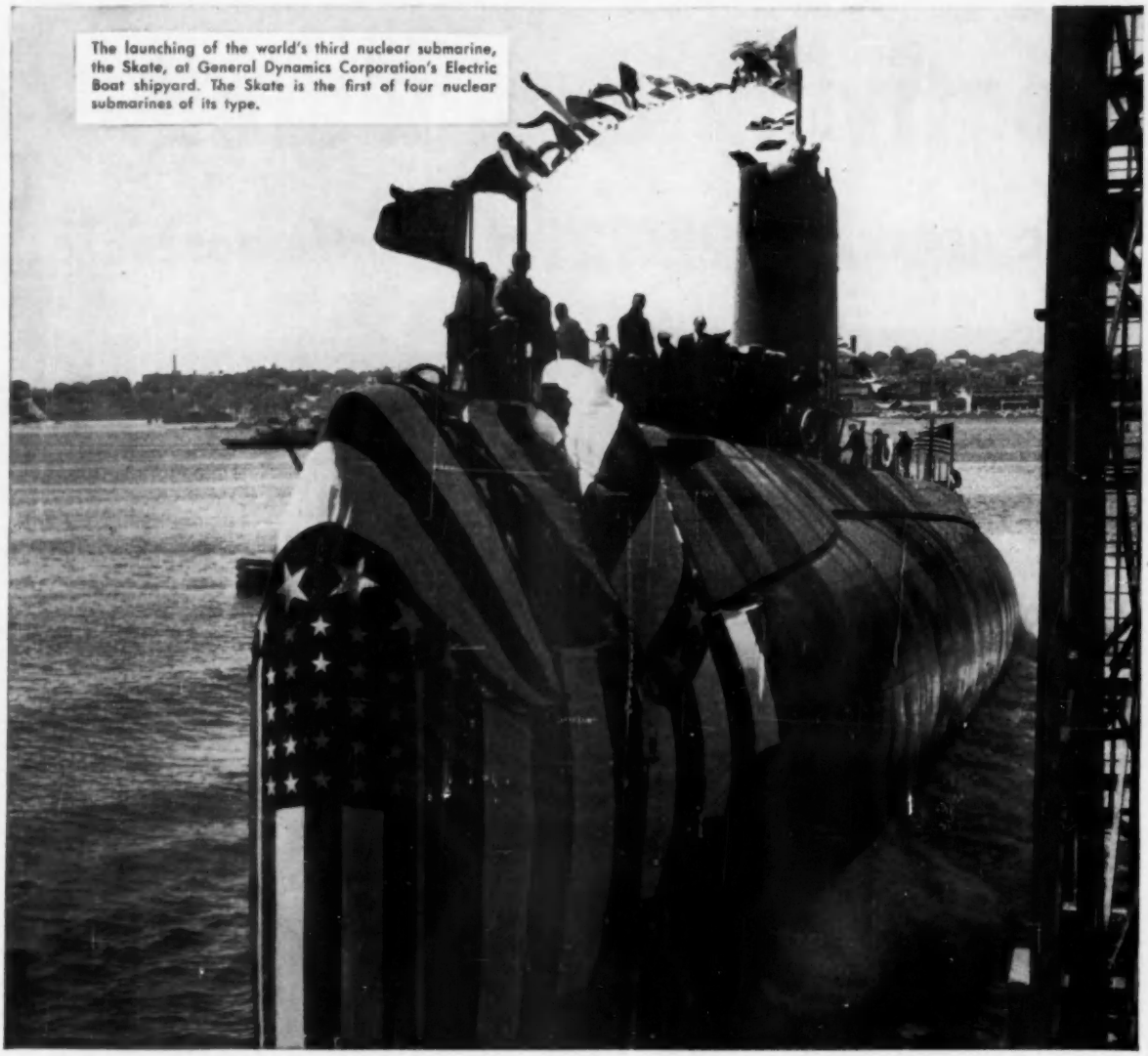
These new Frauenthal 1200 Series machines are available with choice of belt-driven or direct-connected grinding spindles. Machines with either spindle arrangement are offered with 24" dia. tables x 36" swing and 36" dia. tables x 48" swing capacities inside splash guards. Additional swing can be obtained by removing guards.

Write for free Bulletin

1200 Series 36-48" Swing

Special Grinding Machines using standard Slide Units

Frauenthal Division
THE KAYDON ENGINEERING CORP.
MUSKEGON, MICHIGAN, U. S. A.



The launching of the world's third nuclear submarine, the Skate, at General Dynamics Corporation's Electric Boat shipyard. The Skate is the first of four nuclear submarines of its type.

from the SKATE . . .

EXPERIENCE FOR TOMORROW'S AUTOMOTIVE FILTERS

What are the filtration requirements of an atomic submarine? Like any filtration problem, they are a combination of factors, such as: the nature of the fluid to be filtered, operating pressures, temperature, corrosion . . . all of which dictate the filter media and form of the filter. The filters must be engineered to meet the specific requirements of the job. That's why the Electric Boat division of General Dynamics Corporation chose Purolator.

The engineering skills and manufacturing capabilities which make it possible for Purolator to design and build filters for an infinite variety of applications, including nuclear submarines, will produce better automotive filters. In a fast-moving industry, tomorrow's requirements must be anticipated today. Because of its role as designer and builder of filters for all phases of industry, Purolator has, *today*, the experience needed to provide the specific filters you will need for tomorrow's specific requirements.

Your toughest filtration problems are within Purolator's experience.

Filtration For Every Known Fluid

PUROLATOR
PRODUCTS, INC.
RAHWAY, NEW JERSEY AND TORONTO, ONTARIO, CANADA

CALL CRUCIBLE FOR CONSISTENTLY UNIFORM STAINLESS STRIP

From coil to coil and heat to heat, you can rely on the uniformity of Crucible Stainless steel strip—in flatness, in finish, and in metallurgical quality. And Crucible's full integration from raw material to final delivery is your assurance of prompt, dependable service as well. For these two reasons, it pays to call Crucible whenever you need stainless strip. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

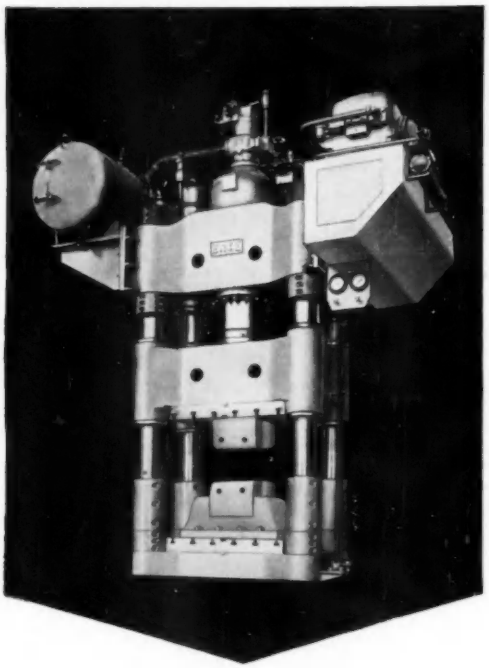
CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

Canadian Distributor — Railway & Power Engineering Corp., Ltd.

PRESS or HAMMER?

..which is best for your forged product?

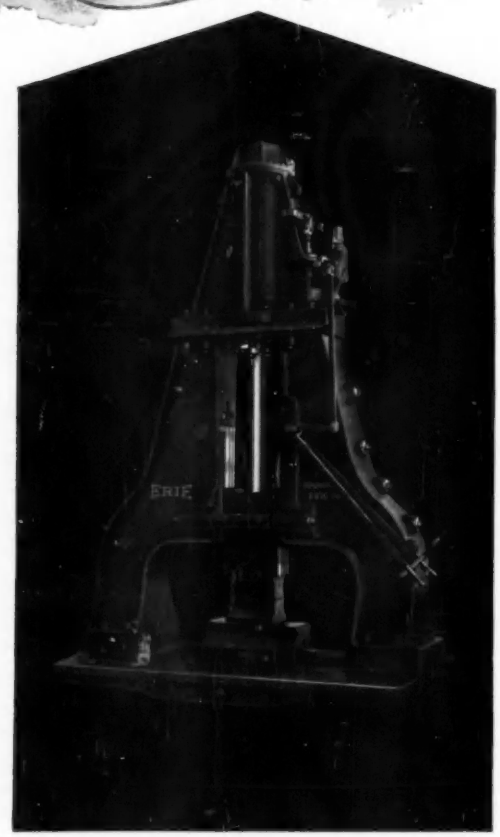


When it comes to open die forgings, there are as many different opinions on what equipment is best as there are open die forge shops and open die forgings.

But, before adding any new equipment, the wise forge shop operator talks with Erie Foundry Company . . . the firm that makes the best in *both* hammers and presses!

Erie's all-steel open die hammers, single frame and double frame, have justly earned their reputation as the industry's most rugged hammers. And now the newer, fast-acting Erie flat die forging presses are proving to be the ideal equipment for meeting the most exacting requirements for any hydraulic press.

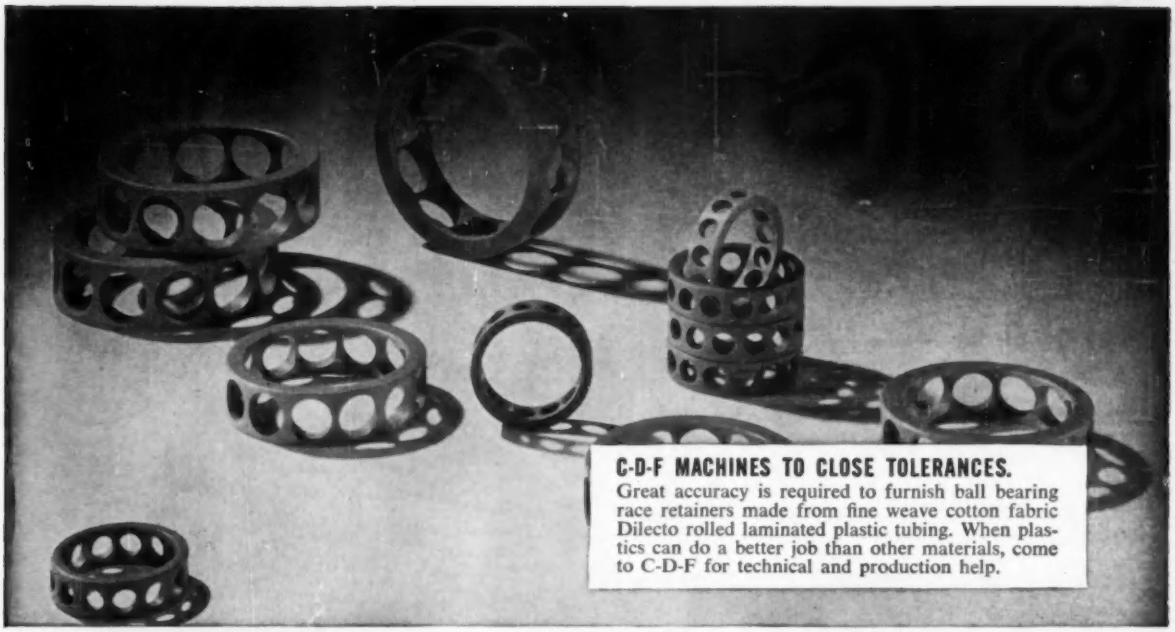
So . . . which is best for you—hammer or press? For expert and *specific* advice, talk to the recognized leader . . . Erie Foundry Company. Just call or write.



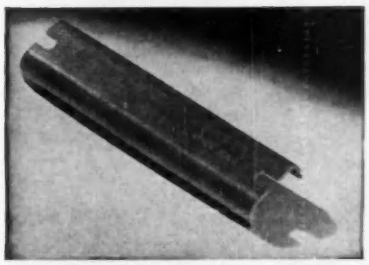
ERIE FOUNDRY CO. ERIE 5, PA.

ERIE

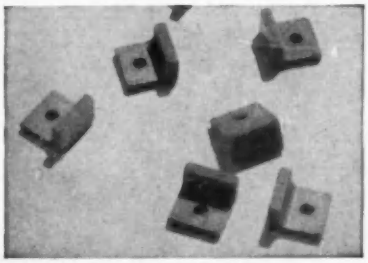
World's Greatest Name in Forging Machines
Since 1895



C-D-F MACHINES TO CLOSE TOLERANCES.
Great accuracy is required to furnish ball bearing race retainers made from fine weave cotton fabric Dilecto rolled laminated plastic tubing. When plastics can do a better job than other materials, come to C-D-F for technical and production help.



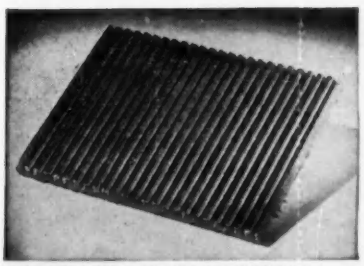
C-D-F PIONEERED IN POST-FORMING of laminated plastics. This technique gives you stronger, more versatile insulating parts with lower costs. This aircraft channel strip is an example of simple post-forming.



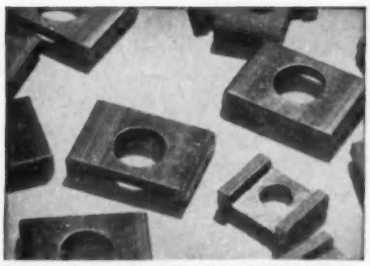
C-D-F DOES THE UNUSUAL. These rubbing blocks are made from fine-weave cotton cloth Dilecto molded *tubing* that has been pierced and cut. The part gains in mechanical strength — the product gets longer service life.

C-D-F SPECIALIZES IN AUTOMATIC SCREW MACHINING of plastic components. These breaker arm bushings are made from Dilecto paper base rolled tubing on high speed machines by men who know and use cost saving methods.

Yes, C-D-F is a big reliable source for fabricated plastics!



C-D-F SERVES MANY INDUSTRIES with fabricated specialties. A great amount is concentrated in the automotive and allied fields. This aircraft part has a corrugated surface on a strong woven asbestos laminated base.



C-D-F IS A PUNCHING SPECIALIST on these starter solenoid insulators. This is XX-26 Dilecto molded channel strip, pierced and punched to length. Special C-D-F punching grades give you lower costs, faster assembly, fewer rejects.

C-D-F COMES UP WITH THE ANSWERS to insulating problems. These unique snap-in grommets are easy to insert, spring out and hold tight. Write for samples. The chances are that C-D-F is already making the answer to your problem.

See our general catalog in Sweet's Design File for more technical data, the address and telephone number of your nearest C-D-F sales engineer. Also, write for detailed information, samples, or send us your print for quotation.

C D F

CONTINENTAL-DIAMOND FIBRE

A SUBSIDIARY OF THE Budd COMPANY • NEWARK 2, DEL.

If it moves...

Timken-Detroit® Brakes can stop it!

the versatile

DLM BRAKE

offers greater flexibility... dependability!

The revolutionary DLM brake will serve effectively with a variety of equipment. It has already proved its value as a control or parking brake, and is used in various sizes on trucks, busses, machinery, farm equipment, cranes, shovels, hoists, golf buggies, lift trucks.

Highly Efficient! The DLM brake is basically a self-energizing two-shoe brake in which both shoes are more efficiently utilized to produce the same amount of work—give equal forward and reverse torque output, regardless of drum rotation.

Simpler! Only 8 parts, with interchangeable shoes and springs. Lubrication is not required. No internal adjustment necessary. Enclosed design guards against entrance of foreign matter and requires only a minimum of maintenance.

Lighter! More Payload Advantages! Improved Timken-Detroit design using lightweight fabricated steel shoes and brake supports saves many pounds over heavier, more costly brakes.

Another Product of...

Rockwell Spring and Axle Co.

ROCKWELL SRA

BRAKE DIVISION
Ashtabula, Ohio

For every industrial, agricultural or automotive application where braking is required!

TODAY'S NEW AUTOMOTIVE DESIGNS DEMAND THE BEST STEEL OBTAINABLE

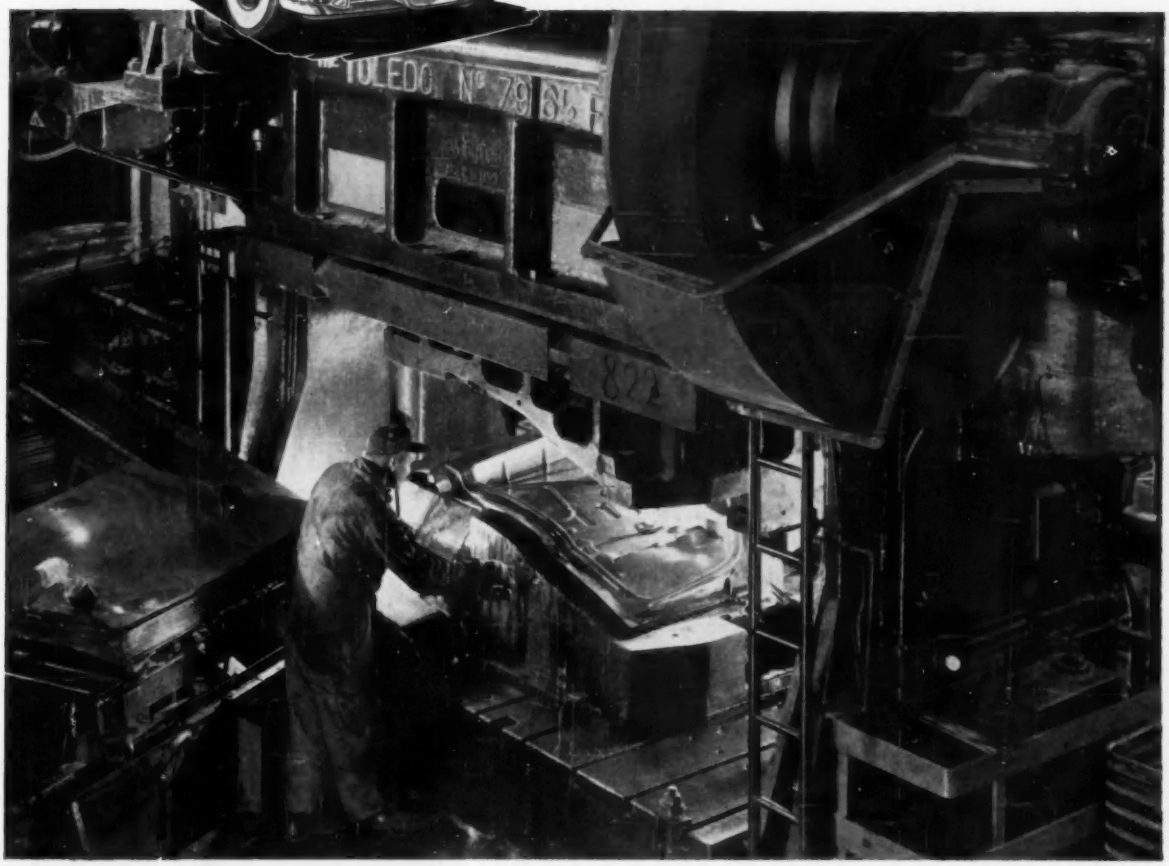
Youngstown Sheets and Strip

Detroit's high-speed automobile body presses are busier than ever turning out body components for today's modern-design cars. More intricate door and fender sections of the new models demand a steel of the highest quality that can take the required deeper draws in its stride. Without question, that steel is Youngstown Cold Rolled Sheets and Strip—the best available anywhere.

Youngstown blends the required combination of surface finish, tensile strength and ductility into every sheet, to provide you almost continuous pressings of even the most difficult-to-form parts. Also, metallurgical quality never wavers from Youngstown's high standards because all operations from ore mining to shipping dock are rigidly quality-controlled by experts with over half-a-century of steelmaking know-how.

On your next order specify Youngstown Cold Rolled Sheets and Strip and join the ranks of our satisfied customers who tell us: "Our production's up—Rejects down—Fabrication costs lowered."

Why not call your nearest Youngstown District Sales Office today, for metallurgical aid or additional information—or write directly to our Home Office.



THE YOUNGSTOWN SHEET AND TUBE COMPANY

General Offices - Youngstown 1, Ohio

District Sales Offices in Principal Cities

Producers of Quality Carbon and Alloy Steels for Over Half-a-Century

QUALITY YOUNGSTOWN SERVICE

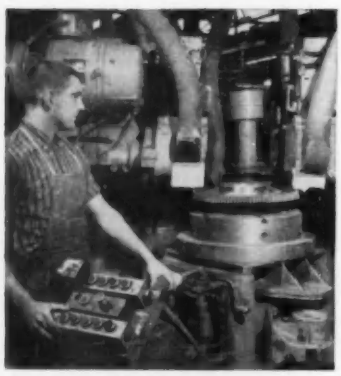
OSBORN®

BEFORE BRUSHING—*Jet engine parts formerly hand-filed and emery-rubbed to remove burrs and sharp edges.* Hand-finishing time: 80 minutes.

AFTER BRUSHING—*Burrs are thoroughly removed, edges and surface junctures are blended to radius tolerances . . . each part is precision-finished quickly, uniformly.* Osborn Brushamatic® finishing time: 8 minutes.

Flying finish for jet engine parts

...10 times as fast with precision OSBORN Brushamatic® Methods



JET ENGINE COMPONENTS *are precision finished automatically at high production rates on Osborn Brushamatic® 51-OOL Machine.*

HERE'S how a jet engine manufacturer has broken a production bottleneck . . . saved dollars and days in the precision-finishing of jet engine components . . . with Osborn Brushamatic® Methods.

Sharp edges, burrs or scratches on components cause stress concentrations and resulting fractures—so a high degree of surface refinement is essential. *Tedious hand finishing each of these parts used to take 80 minutes.* Still, job quality was inconsistent . . . costly in time and money.

Today, Osborn Brushamatic does the same job in 8 minutes . . . 10 times as fast . . . with a high-quality, uniform finish held to micro-inch specifications.

It's typical of how Osborn Power Brushing works to help *you* speed production . . . cut costs . . . improve product quality. An **O**sborn **B**rushing **A**nalysis, made in your plant at no obligation, will show you how. Write us for details—and for your copy of the 20-page Brushamatic® booklet. *The Osborn Manufacturing Company, Dept. E-59, Cleveland 14, Ohio.*

Osborn Brushes

BRUSHING MACHINES • BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES • FOUNDRY PRODUCTION MACHINERY

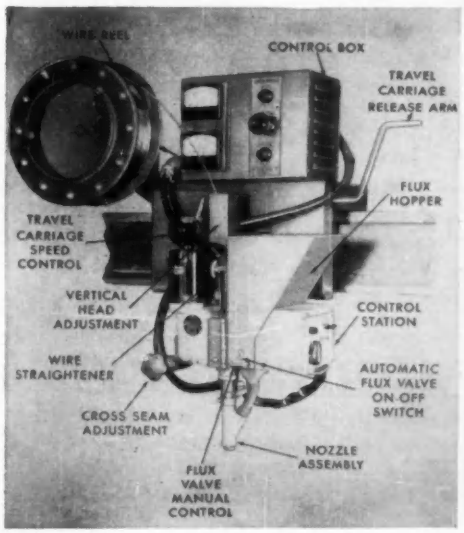
Production Increased 35%

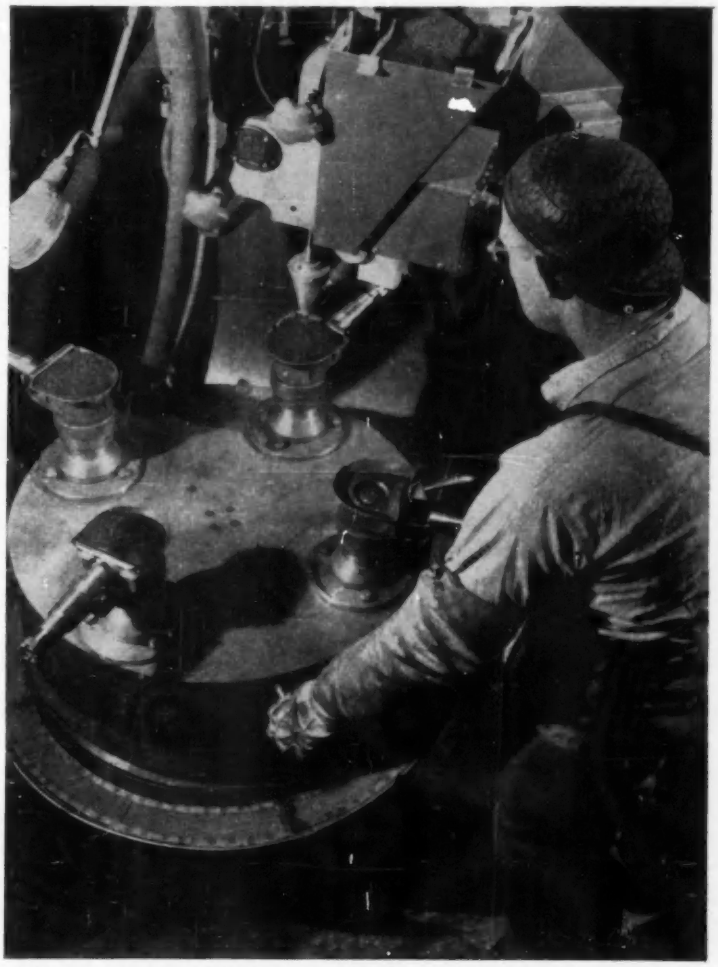
with LINCOLNWELD

Automatic Submerged Arc Welder

HERE steering knuckles for tractors are produced by Lincolnwelding a forging to a spindle. Production has been increased from 56 to 76 pieces per hour. Welding cost has been reduced $1.80 per hundred pieces.

Cost reducing benefits like these are possible on many types of fabrication with the dependable Automatic Lincolnweld. Call in the Lincoln Welding Engineer in your city. Ask him for a recommendation of how Lincolnweld can cut your costs.





Welding steering knuckles for tractors with LINCOLNWELD automatic submerged arc welder. Courtesy of International Harvester Company, Milwaukee, Wisconsin.

THE

LINCOLN ELECTRIC

COMPANY

Cleveland 17, Ohio

The World's Largest Manufacturer of Arc Welding Equipment

For details and specifications of Automatic Lincolnwelds, send coupon for Bulletin SB-1355.

Fill out and mail to:
The Lincoln Electric Company
Dept. 1007, Cleveland 17, Ohio

☐ Send Bulletin SB-1355.
☐ Have Welding Engineer call.

Name_____

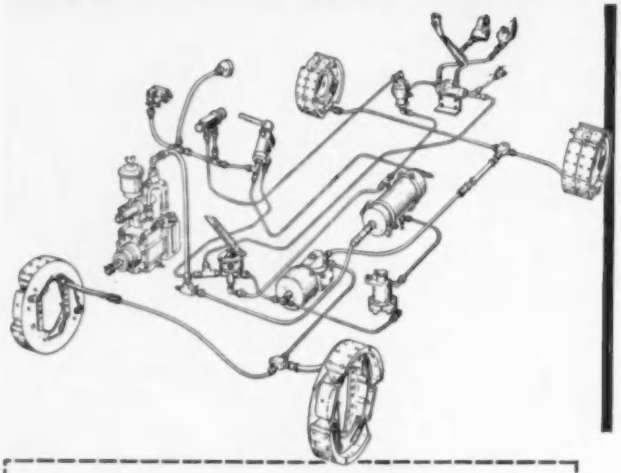
Company_____

Street_____

City_____ Zone____ State_____

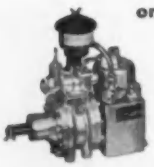
Position_____

Wagner AIR-OVER-HYDRAULIC BRAKES increase payload capacity and offer these six important operating advantages!



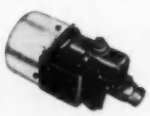
- Faster application and release of air pressure.
- More efficient use of compressed air
- Greater stopping power
- Reduced friction loss
- Increased lining and drum life
- Greater stability with less preventive maintenance.

only Wagner offers...



THE ROTARY AIR COMPRESSOR

9 or 12 c.f.m. capacity—rotary motion reduces vibration, makes friction loss low, operating efficiency high, assures long life with a minimum of maintenance. Fast air recovery assures an adequate supply of air pressure at all times—an important safety factor... Compactly built.



THE POWER CLUSTER

converts 100 p.s.i. of air pressure into 1500 p.s.i. of unvarying hydraulic pressure for greater road safety and surer stopping power. Consists of an air-power cylinder assembled direct to a standard hydraulic master cylinder. No loss due to linkage or friction.

Wagner Air-Over-Hydraulic systems are designed to eliminate bulky, heavy, out-board rigged actuating devices and many valves and lines to permit greater pay load capacity through vehicle net weight reduction. These actuating systems also offer finer performance features for safer braking of heavy vehicles equipped with hydraulic foundation brakes.

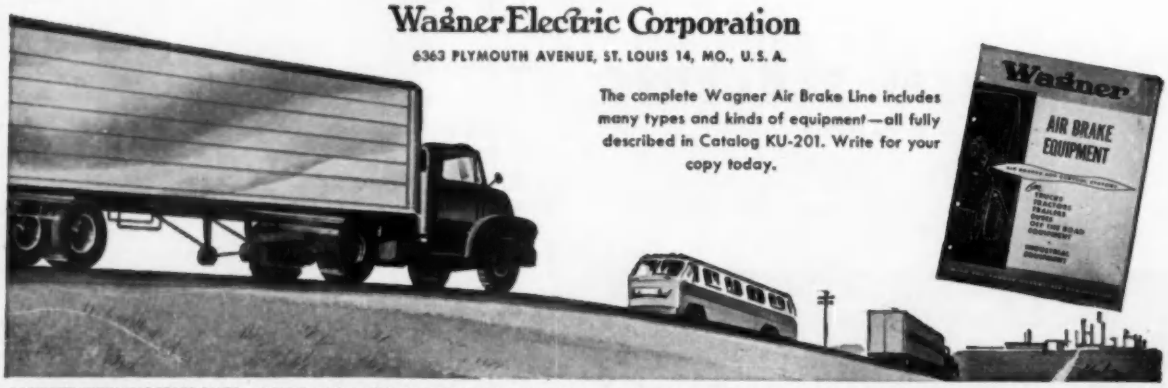
But get the whole story on Wagner Air-Over-Hydraulic Air Brakes for yourself—*first* in economy, reliability and maximum brake safety. Send for Catalog KU-201 that describes the performance and safety features you add to the trucks you manufacture by equipping them with Wagner Air Brakes.

K57-19

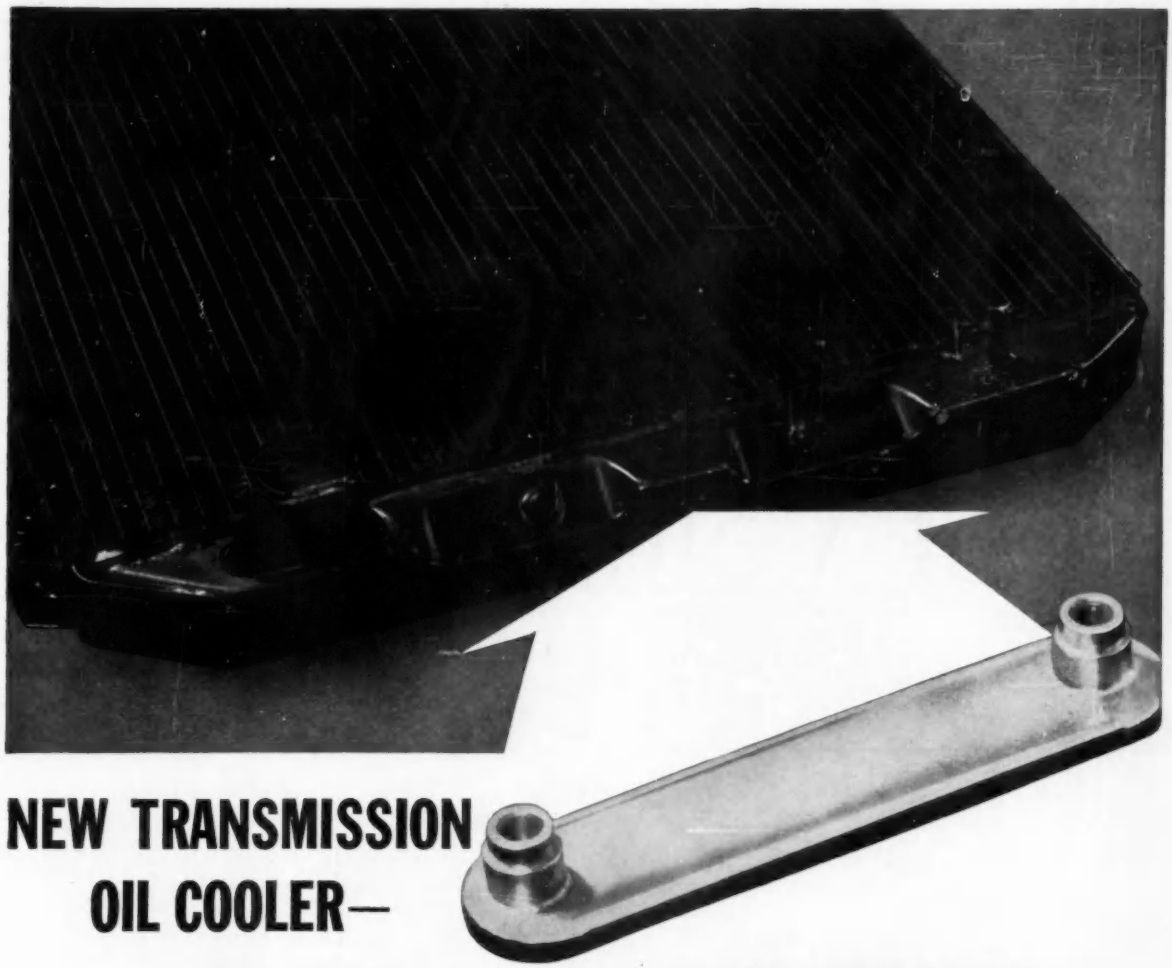
Wagner Electric Corporation

6363 PLYMOUTH AVENUE, ST. LOUIS 14, MO., U.S.A.

The complete Wagner Air Brake Line includes many types and kinds of equipment—all fully described in Catalog KU-201. Write for your copy today.



LOCKHEED HYDRAULIC BRAKE PARTS and FLUID • NoRoL • CoMoX BRAKE LINING • AIR BRAKES • AIR HORNS • TACHOGRAPHS • ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES



NEW TRANSMISSION OIL COOLER—

another First for ALLEGHENY STAINLESS

Over 70% of today's cars are powered with automatic transmissions. Fine for the motorist, but new problems for the designer. Transmission oils zoom to 300 degrees and must be cooled.

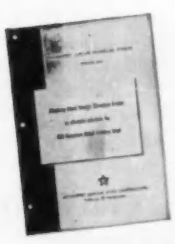
Solution? Mount a small, efficient heat exchanger within the lower tank of the radiator, as shown above. Make it able to stand wide temperature differentials—surrounding cooling water from 0° to 180°; searing oil of 300°. Make it corrosion proof—against all types of water, all varieties of anti-freeze compounds, dirty, hot oil. Since it's tucked inside the radiator, make it strong and maintenance-free.

Allegheny 430 Stainless Steel has proved itself to meet all these design objectives. And it actually reduced unit cost over other materials while still improving performance. The ductility and corrosion resistance of this straight chromium stainless make it a natural for this type of application.

Perhaps *your* product could be improved by a switch to Allegheny 430. It costs less than chromium-nickel stainless grades, it's always readily available, not subject to nickel shortages. To find out how Allegheny 430 Stainless can help you, write for the Technical Bulletin described below or call the Allegheny Ludlum Sales Office nearest you.

Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.

WSW 6792



Write for this 16-page Technical Study that describes alternate selections available for the Chrome-Nickel Stainless Steels. Gives properties, fabrication data, etc.

ADDRESS DEPT. AI-96

Make it BETTER and LONGER LASTING with

ALLEGHENY STAINLESS

Warehouse stocks carried by all Ryerson steel plants

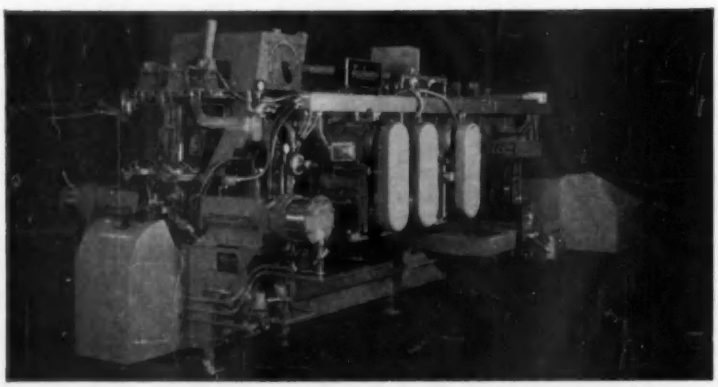
one-source production lines spark interest of volume producers...

The prospect of ordering an entire production line, ready made to produce a part to specification, has arrested the interest of many of the nation's top production engineers.

One source responsibility assuring better service; a line 100% harmonic, all stations engineered to work in perfect synchronization; integrated and automated handling of work in process; utilization of common drives and bases, reducing operating costs and floor area, are some of the advantages of the packaged line that has production people talking.

Federal/Warco pioneered the packaged line and have already produced automated lines combining such operations as blanking, forming, drawing, welding, machining, drilling, assembling on a common base.

For additional information contact the Federal/Warco representative nearest you or write direct.



This Federal Packaged Production line welds, spot faces, reams, de-burrs, sets six bolts and welds them in place . . . ejecting finished pedal brackets at a rate of 775 pieces per hour.

Federal / Warco
PACKAGED
PRODUCTION LINES

THE FEDERAL MACHINE AND WELDER COMPANY - WARREN, OHIO

422 AFFILIATED WITH BERKELEY-DAVIS, INC., DANVILLE, ILLINOIS, MANUFACTURERS OF AUTOMATIC ARC WELDING EQUIPMENT.

ANOTHER GREAT PRODUCT OF AC ENGINEERING CREATIVITY!

air-fluid separators

for air-ride systems

Pass several tests in automotive industry for die casting porosity and tolerances!

◀ Air-Fluid Separator prevents contamination of air-ride system by removing oil and moisture before it can enter Oldsmobile's exclusive New-Matic Ride.

Specially designed testing device, using ▶ pressurized nitrous oxide, automatically checks complete unit for leakage and three precision valves for function.

When Oldsmobile designed its exclusive New-Matic Ride, the only true closed-system air suspension, it looked to AC engineering creativity to design and produce the all-important Air-Fluid Separator! This Separator must remove all oil and water to prevent contamination of the rubber air springs and other precision components!

The aluminum die castings and special diaphragm of the Air-Fluid Separator must withstand peak compressor pressures of 350 psi—pressure surges under the severest driving conditions—and control leakage to a maximum of four cubic inches of free air per hour!

Every Air-Fluid Separator must meet these exacting demands before it is released to Oldsmobile by AC. A testing method unique in the automotive industry, the Versatrol is employed in these tests. Nitrous oxide, pressurized to 350 psi, is introduced into the Separator to simulate maximum operating conditions. The super-sensitive Versatrol can detect as little as one part per million of any leakage of the telltale gas.

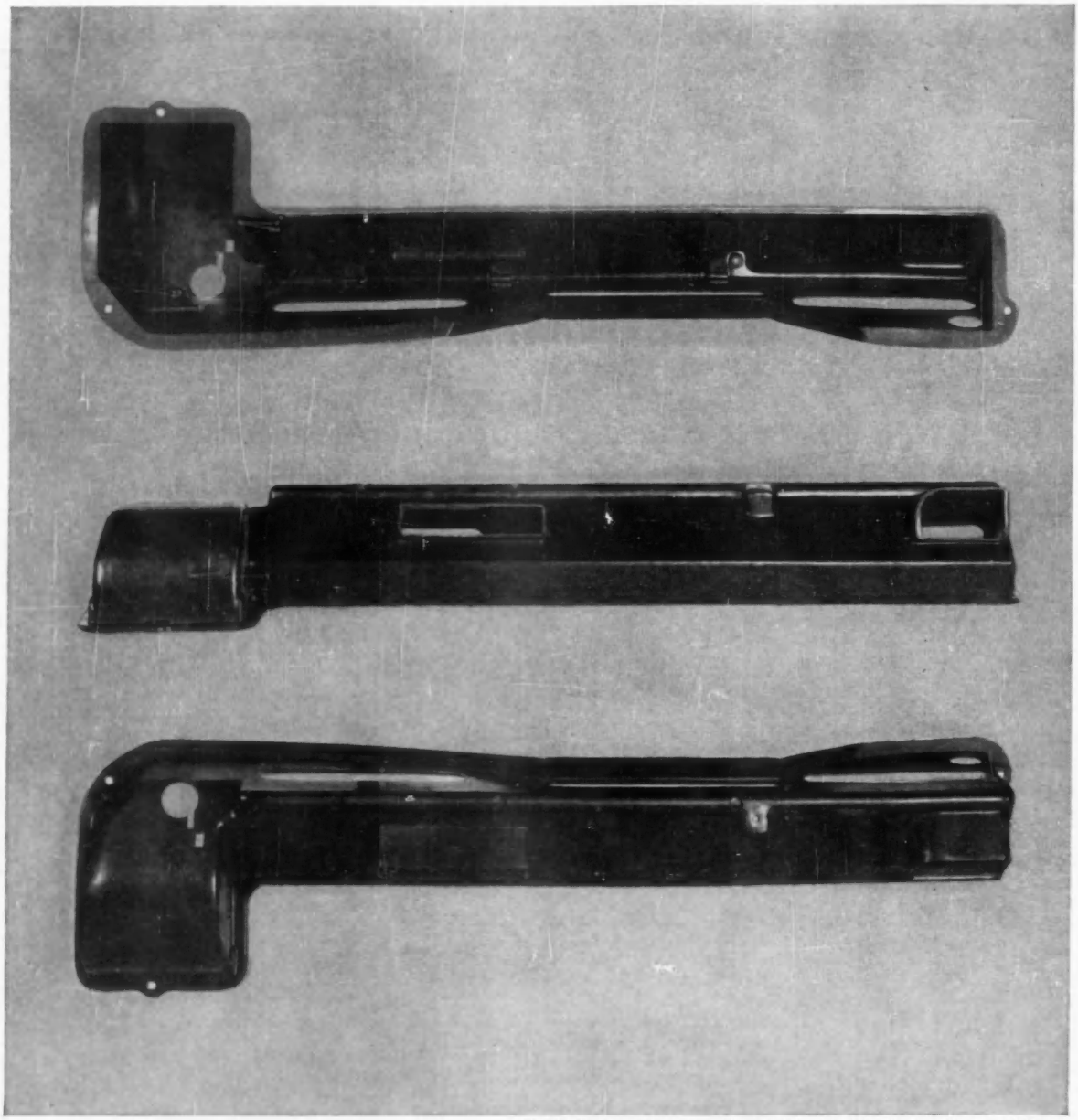
In addition, Air-Fluid Separators are selected from production and subjected to a "burst" test of 750 psi and inspected for possible failures.

The Air-Fluid Separator is another fine example of AC's cooperation with clients to design and produce units on schedule. Consult any AC Office about your needs!

AC THE ELECTRONICS DIVISION OF GENERAL MOTORS

GM FORWARD FROM EIFTY

Watch Walt Disney Studios' ZORRO every week on ABC-TV



Heater housing, a premix molding by Woodall Industries, Inc., Detroit, Michigan.

Premix moldings save time, money and trouble

If your product calls for reinforced plastics, you'll save time, money and trouble with premix moldings. Small or large, simple or complex, you'll get quality molding faster and at less cost when resin and reinforcing fiber are blended beforehand.

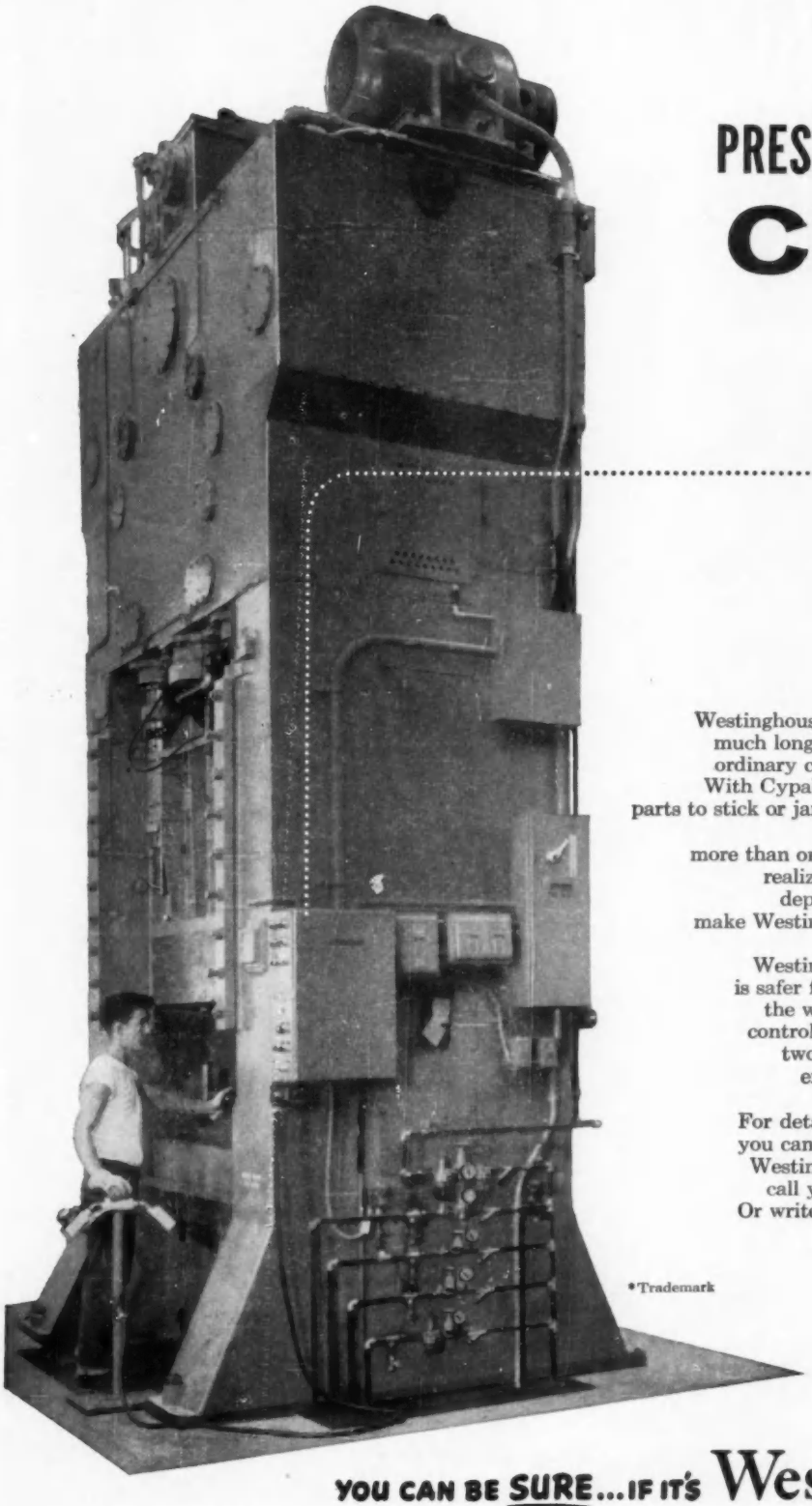
Premix moldings eliminate resin-rich areas, provide uniform wall thicknesses and strength. They eliminate many finishing operations necessary in hand lay-up molding. Slots, grooves, holes, bosses and parts with varying wall thicknesses are formed in the mold. For strong, rigid, reinforced plastics, premix moldings have proved ideal . . . on the production line as well as in the finished product.

Polyester resin with Dow Vinyltoluene or Dow Styrene offers all the special properties necessary for successful premix moldings. Specify resins based on vinyltoluene—Dow supplies vinyltoluene to resin manufacturers. THE DOW CHEMICAL COMPANY, Midland, Michigan, Plastics Sales Department 1888G-1.

YOU CAN DEPEND ON DOW

LASTS 15 TIMES LONGER, YET COSTS LESS THAN $200.00 MORE

WESTINGHOUSE PRESS CONTROL WITH CYPAK



Westinghouse press controls with Cypak* last much longer . . . up to 15 times longer than ordinary controls using conventional relays. With Cypak static control there are no relay parts to stick or jam and cause a repeat of the press. Priced at less than $200 more than ordinary press controls, the savings realized from many additional years of dependable, maintenance-free service make Westinghouse press control with Cypak your most economical buy.

Westinghouse press control with Cypak is safer for the operator, the machine and the work. Patented anti-repeat clutch-control circuit is self-checking, requiring two impulses to initiate a stroke. An externally operated circuit breaker is an additional safety device.

For detailed information about the ways you can benefit from safer, longer lasting Westinghouse press control with Cypak, call your Westinghouse sales engineer. Or write to Westinghouse Electric Corp., 3 Gateway Center, P.O. Box 868, Pittsburgh 30, Pa.

*Trademark

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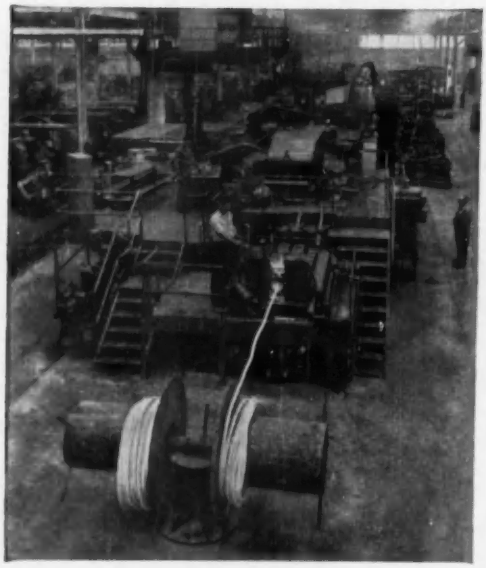
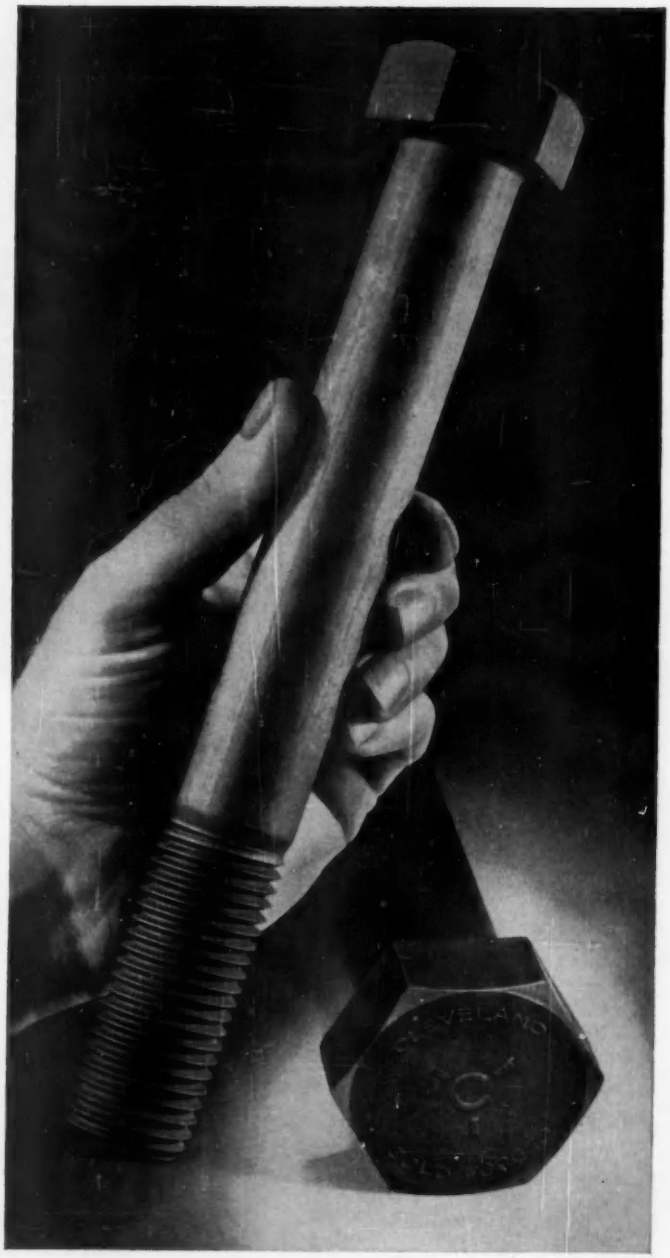
YOU CAN BE SURE...IF IT'S Westinghouse

NOW—CLEVELAND COLD FORGED LARGE DIAMETER CAP SCREWS

for greater strength, closer tolerances, finer finishes





With the world's largest Boltmaker—1¼ in. diameter capacity—added to its mass production cold forging facilities, Cleveland can now give immediate delivery on production quantities of large diameter hexagon head cap screws. By this cold forging method, known as the Kaufman Double Extrusion Process, and originated and developed by Cleveland, up to 38 complete cap screws are produced every minute—with high fatigue and shock resistance due to increased tensile strength and controlled grain flow. Finishes are finer, too. Surface scale is eliminated, and 50 to 65 microinch finishes can be maintained without stress raisers and tool marks. Body tolerances can be held as close as .004 in.

Large diameter hexagon head cap screws—⅞, 1, 1⅛ and 1¼ in.—up to and including 10 in. (maximum length) can be completely cold formed automatically; also hexagon and square head machine bolts, high strength structural bolts, shoulder screws, big rivets, forgings, and other large size fasteners and components, in low carbon, high carbon heat treated, and alloy steels.

We have specialized in cold forming close tolerance parts—many with unusual or extreme upsets—for over 40 years. Now we can make them much larger. It will pay you to discuss your fastener needs with us, particularly at the design stage.

Contact us for detailed information today

THE CLEVELAND CAP SCREW COMPANY 4444-10 Lee Road, Cleveland 28, Ohio

WAREHOUSES: Chicago • Philadelphia • New York • Los Angeles

Thermal Stress-Relieving of Alloy Steels

In the production of alloy steel bars and parts made of alloy steel, stresses are sometimes set up, and these stresses must be relieved before optimum results can be expected. Two general types of stress-relieving are practiced—thermal and mechanical. In this discussion we shall consider only the former.

There are several important reasons for thermal stress-relieving. Among these are the following:

(1) The first and most fundamental purpose is to reduce residual stresses that might prove harmful in actual service. In the production of quenched and tempered alloy steel bars, machine-straightening is necessary. This induces residual stresses in varying degrees. Bars are usually stress-relieved after the straightening operation. When the bars are subjected to later processing that sets up additional stresses, subsequent stress-relieving may be necessary.

(2) A second major purpose of thermal stress-relieving is to improve the dimensional stability of parts requiring close tolerances. For example, in rough-machining, residual stresses are sometimes introduced, and these should be relieved if dimensional stability is to be assured during the finish-machining.

(3) Thermal stress-relieving is also recommended as a means of restoring mechanical properties (especially ductility) after certain types of cold-working. Moreover, it is required by the "safe-welding" grades of alloy steels after a welding operation has been completed.

Alloy bars are commonly stress-relieved in furnaces. Temperatures under the transformation range are employed, and they are usually in the area from 850 deg to 1200 deg F. The amount of time required in the furnace will vary, being influenced by grade of steel, magnitude of residual stresses caused by prior processing, and mass effect of steel being heated. After the bars have been removed from the furnace, they are allowed to cool in still air to room temperature.

In the case of quenched and tempered alloy bars, the stress-relieving temperature should be about 100 deg F less than the tempering temperature. Should the stress-relieving temperature exceed the tempering temperature, the mechanical properties will be altered.

Items other than bars (parts, for example) can be wholly or selectively stress-relieved. If the furnace method is used, the entire piece is of course subjected to the heat; selective relieving is impossible. However, if a liquid salt bath or induction heating is used, the piece can be given overall relief or selective relief, whichever is desired.

Detailed information about stress-relieving is available at all times through Bethlehem's technical staff. Feel free to consult with our metallurgists, who will cooperate fully without cost or obligation on your part. And remember that Bethlehem can furnish the entire range of AISI standard alloy steels, as well as special-analysis steels and all carbon grades.

If you would like reprints of this series of advertisements from No. I through No. XX, please write to us, addressing your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa. The first 20 subjects in the series are now available in a handy 36-page booklet, and we shall be glad to send you a free copy.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

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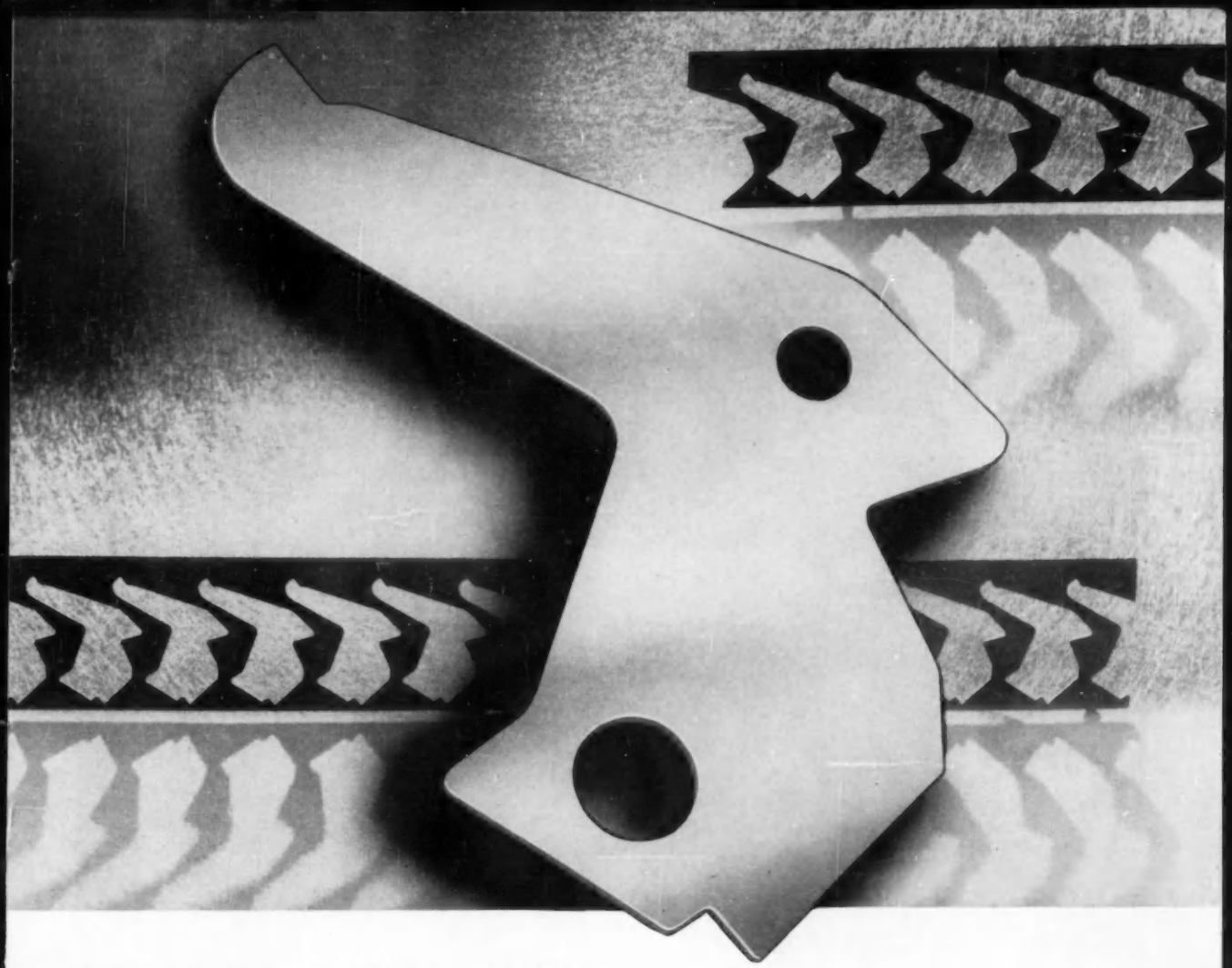
BETHLEHEM STEEL



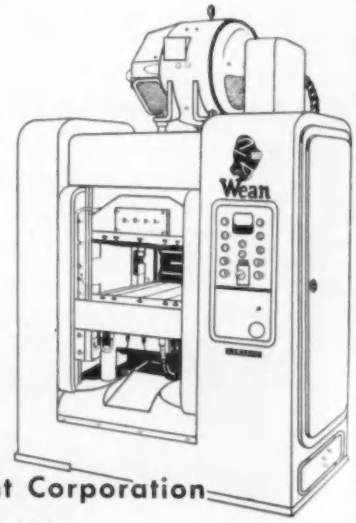
Production up almost 300% on compound pierce-and-blank operation

Production Rate: **Conventional press — 90 pieces a minute**
Wean "Flying Press" — 335 pieces a minute

The piece illustrated above is a circuit breaker cradle stamped out of .064 gauge strip steel. Length of index was 1¼". Involving a compound pierce-and-blank operation, it was produced on a conventional press at the rate of 90 parts per minute at the Westinghouse plant in Beaver, Pennsylvania. Using the same dies in a 60-20-36 "Flying Press", Westinghouse increased production to 335 parts per minute.

Speed, however, is only one phase of the "Flying Press" story. Automatic operation, centrally located controls, greatly reduced maintenance — all combine to make this the most remarkable press development since the turn of the century.

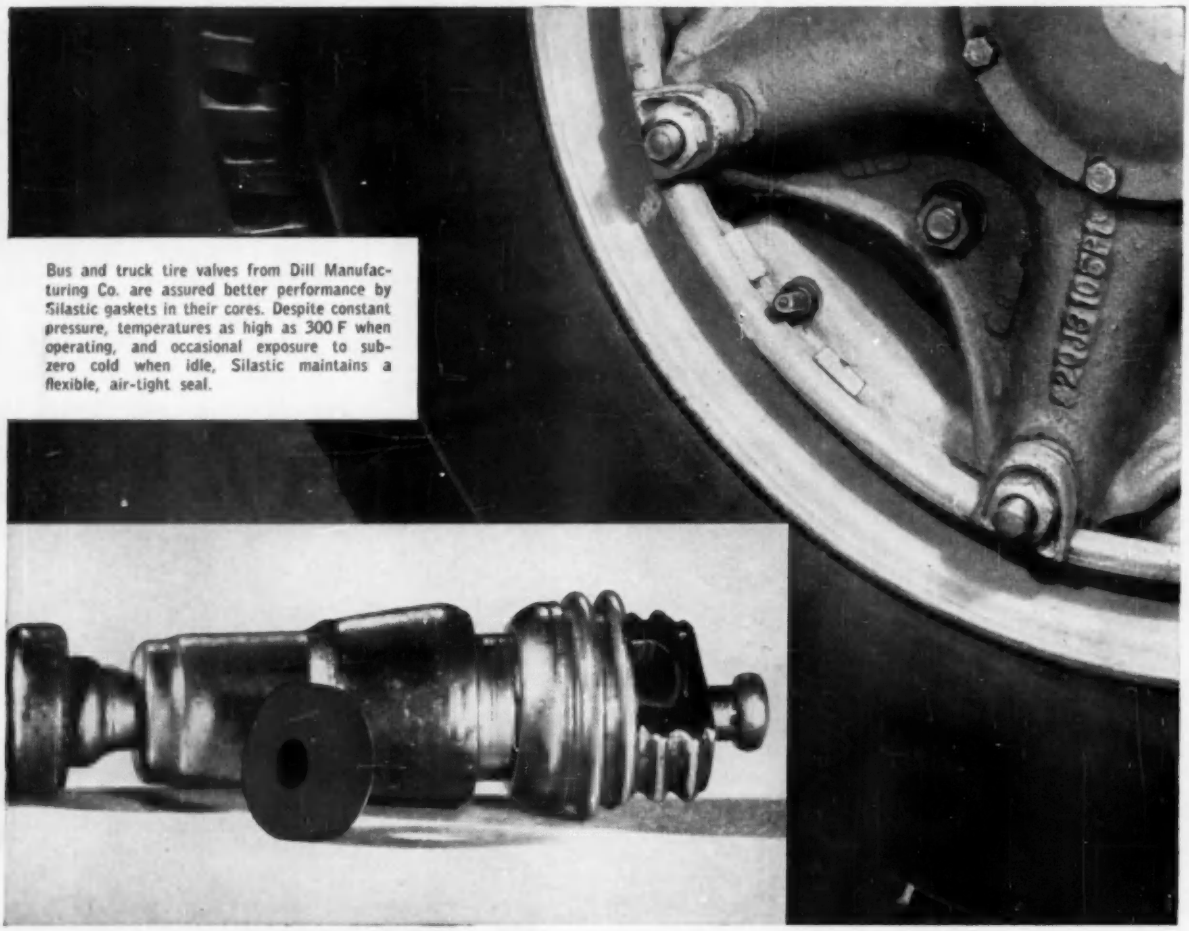
The whole story is covered in detail in the Wean "Flying Press" Brochure. Write for it today.



Wean Equipment Corporation
CLEVELAND 17, OHIO

BLANKING | PROGRESSIVE BLANKING | COMPOUND PIERCE-and-BLANK | PROGRESSIVE DRAWING | PROGRESSIVE FORMING

325



Bus and truck tire valves from Dill Manufacturing Co. are assured better performance by Silastic gaskets in their cores. Despite constant pressure, temperatures as high as 300 F when operating, and occasional exposure to sub-zero cold when idle, Silastic maintains a flexible, air-tight seal.

SILASTIC resists heat, cold, high compression

SILICONE RUBBER

For resistance to fuels, oils and solvents, specify Silastic LS

Where conditions are too severe for organic rubber, yet rubbery properties are needed, try Silastic*, the Dow Corning silicone rubber. Silastic stays resilient from —130 to 500 F, and has very low compression set at extreme temperatures. It resists moisture, weathering, most hot oils and has high dielectric strength. Leading rubber companies offer Silastic as calendered, extruded and molded parts in either solid or sponged form.

Get latest data on Silastic. Mail coupon today

Dow Corning Corporation, Dept. 0624
Midland, Michigan

Please send me latest data on Silastic

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Typical Properties of Silastic for Molded Parts

• Temperature range, °F	—130 to 500
• Tensile strength, psi	600 to 900
• Elongation, %	150 to 300
• Compression set, %, @ 300 F	15 to 40
• Hardness range, durometer	20 to 90
• Dielectric strength, volts/mil	400 to 500
• Oil resistance	Dependent on type of oil

*T.M. REG. U.S. PAT. OFF.

If you consider ALL the properties of a silicone rubber, you'll specify SILASTIC

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

▸ Get Mallory Standard Welding Electrodes From Your Mallory Welding Distributor

When you're looking for ways to cut costs in resistance welding, call on your nearby Mallory Welding Distributor. He carries the most complete line of standard resistance welding electrodes ever offered. And he can help you select standard, delivered-from-stock electrodes for many fabricating jobs for which you may have been using expensive, custom-made tooling.

In the Mallory line are fluted and round hole Elkaloy®-A and Mallory-3® electrodes in all three standard Morse taper shanks . . . dome, flat and center-insert Elkonite®-faced electrodes...5 types of socket electrodes . . . flat and centered male and female threaded Elkonite-faced electrodes with Elkonite shanks . . . and 24 types of irregular electrodes of various dimensions and tapers.

The complete line is described in Mallory's new catalog of standard resistance welding electrodes. Ask your Mallory Welding Distributor for your copy. If you are not yet acquainted with a Mallory Distributor, write Mallory for the name and address of the one serving your area.

OVER 30 YEARS OF RESISTANCE WELDING LEADERSHIP

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry Street, Toronto 15, Ontario

Serving Industry with These Products:

Electromechanical — Resistors • Switches • Tuning Devices • Vibrators
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P. R. MALLORY & CO. Inc.
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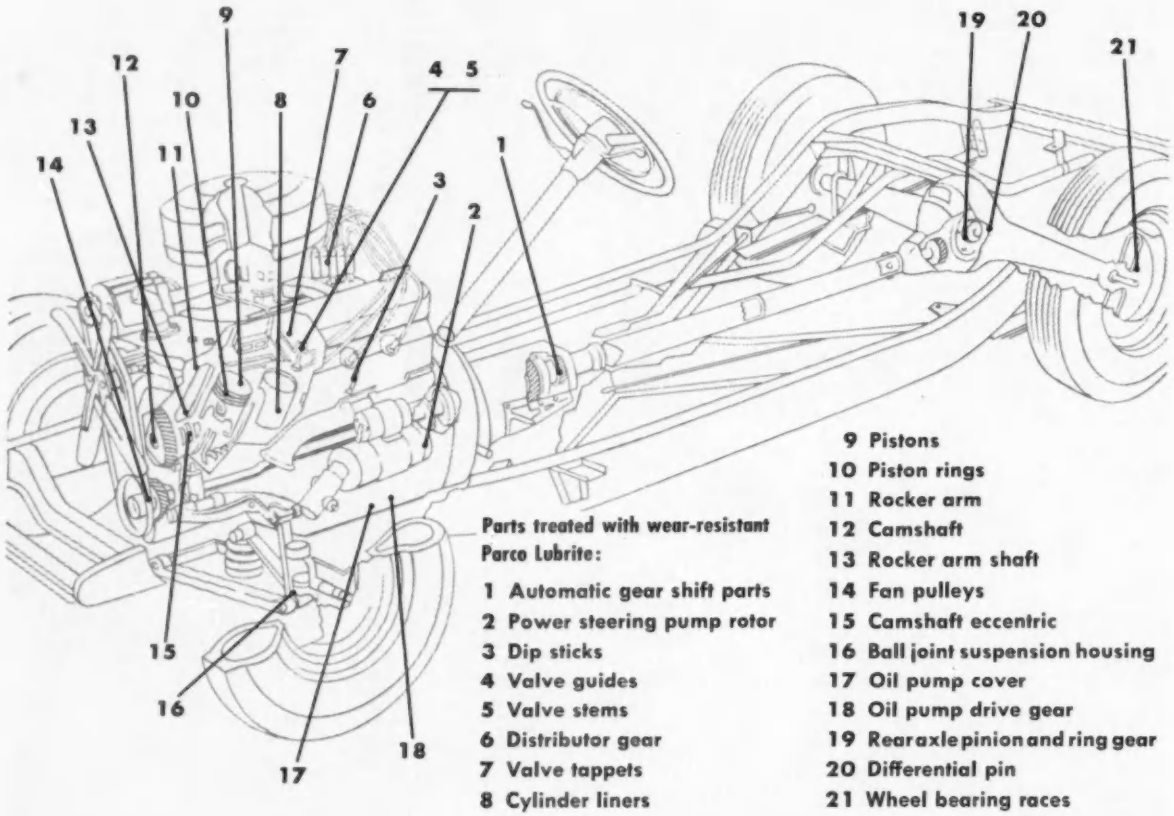
For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio



Parts treated with wear-resistant Parco Lubrite:

1 Automatic gear shift parts
2 Power steering pump rotor
3 Dip sticks
4 Valve guides
5 Valve stems
6 Distributor gear
7 Valve tappets
8 Cylinder liners
9 Pistons
10 Piston rings
11 Rocker arm
12 Camshaft
13 Rocker arm shaft
14 Fan pulleys
15 Camshaft eccentric
16 Ball joint suspension housing
17 Oil pump cover
18 Oil pump drive gear
19 Rear axle pinion and ring gear
20 Differential pin
21 Wheel bearing races

The automotive industry shows how to save money by using Parco Lubrite

Wearing surfaces—the vital parts that move or roll or slide against each other—can cost the manufacturer far more than their original price.

If one of them fails prematurely in use, because of improper break-in, there's the cost of replacement, the field service charge, and the customer's ill-will to be reckoned with.

To promote smooth, safe initial operation, to prevent galling, scoring and welding, and to lengthen subsequent life, friction parts should be treated with Parco Lubrite.

This nonmetallic, oil-holding coating eliminates metal-to-metal contact during wearing-in, keeps a film of lubricant between bearing surfaces, provides priceless protection for fractions of pennies.

Automobile manufacturers have cut field service costs by the use of Parco Lubrite. How about *your* product? Let the Parker technical representative investigate for savings!

DETAILED TECHNICAL INFORMATION

Technical bulletin, with photomicrographs and data, on Parco Lubrite wear-resistant coatings. Send for it. It's free.

Since 1914—leader in the field

PARKER RUST PROOF COMPANY
2178 E. MILWAUKEE, DETROIT 11, MICHIGAN

BONDERITE corrosion resistant paint base
BONDERITE and BONDERLUBE aids in cold forming of metals
PARCO COMPOUND rust resistant
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TROPICAL heavy duty maintenance paints since 1883

**Bonderite, Bonderlube, Parco, Parco Lubrite, Parker Pre-Namel—Reg. U.S. Pat. Off.*

Heintz Achieves Volume Production with New Sciaky Counter Control Welders

In fabricating and job shops, where a wide variety of assemblies must be welded to rigid specifications every day, Sciaky resistance welding helps keep production schedules *on schedule*.

The Jet Engine Division of the Heintz Division, Kelsey-Hayes Company, a large Philadelphia contract fabricator, manufactures original and replacement parts for the aircraft industry. This means their production must meet exacting jet engine specifications.

New Sciaky Counter Control

To help meet these requirements, Heintz now uses Sciaky Patented Three-Phase Resistance Welders with the new Predetermined Electronic Counter Control. This new unit provides precise control of all welder functions for absolute production consistency. All control settings are realized with extreme accuracy, and are readily reproduced at any time to duplicate previous production runs. The machine cannot deviate from its setting.

Fig. 1 Seam welding Nimonic to Nimonic on Pratt & Whitney Aircraft J-57 afterburner diffuser section.

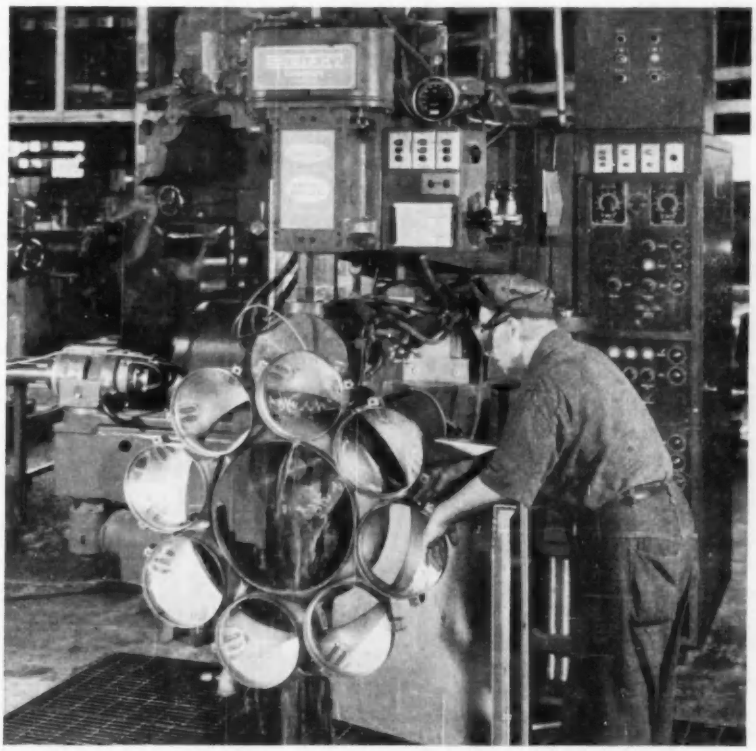

Fig. 2 Seam welding stainless to stainless on Pratt & Whitney Aircraft J-57 jet engine transition duct assembly. Note simple fixture used.

The Sciaky Predetermined Electronic Counter Weld Control is the only control of this type that has been proved in service, and the first unit of this kind has now been in use nearly two years.

How It Works

The Sciaky Predetermined Electronic Counter Control counts the cycles of power line frequency which is governed by the U.S. Naval Observatory. In predetermined absolute numbers, cycles and impulses are simply counted by a Dekatron tube to control the duration of the various welder functions. The absolute consistency of the control eliminates the need for time-consuming periodical check-out or calibration. Plug-in feature permits easy unit replacement, or addition of other control functions if required.

Operations Performed

Photos show typical Sciaky resistance welding applications on jet engine parts—Afterburners, Screech Screens, Engine Duct Assemblies, etc. Materials welded include Nickel Alloy, Nimonic and Stainless Steel.

Information Available

Case histories outlining the successful use of Sciaky Resistance Welding Techniques on jet engine components are available on request. Specific recommendations will be furnished on receipt of an outline of your requirements.

Write today, mentioning the information you would like to receive. There is no obligation. Sciaky Bros., Inc., 4925 W. 67th St., Chicago 38, Ill. POrtsmouth 7-5600.

62-C

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Advertisers

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CLEAR-O-MATIC*

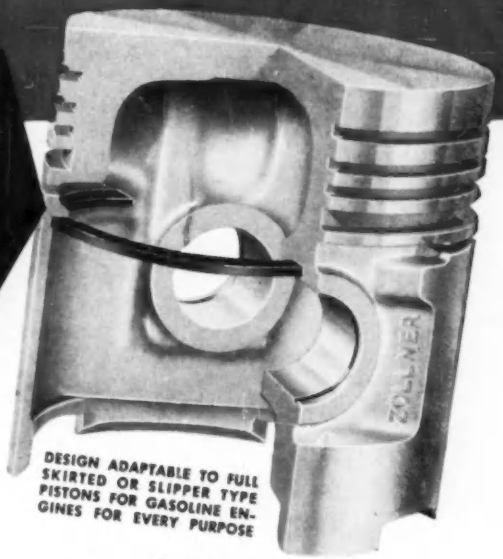
The All-Temperature Piston

UNIFORM SKIRT CLEARANCE FROM 20° BELOW ZERO TO 200° F

STEEL TENSION MEMBER

Anchored only at pin bosses and cast in positive contact with I.D. of piston skirt

Controls Clearance Automatically

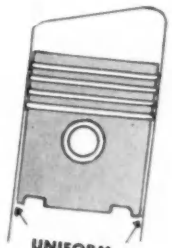


DESIGN ADAPTABLE TO FULL SKIRTED OR SLIPPER TYPE PISTONS FOR GASOLINE ENGINES FOR EVERY PURPOSE

Sensational Performance

Requires less than .001 Clearance

Cold or Hot, Clear-O-Matic Piston clearance stays constantly uniform. Required clearance is reduced to less than .001. This great development of the "All-Temperature" Piston by Zollner engineers provides another fine feature attraction for the modern motor car . . . smooth, quiet running engine . . . no cold slap . . . reduced friction without loss of durability or heat conductivity . . . no danger of scuffing or seizing. We suggest a test of these sensational performance advantages for your engine.



UNIFORM EFFECTIVE SKIRT CLEARANCE AT ALL TEMPERATURES

1. Clearance maintained uniformly at all coolant temperatures from 20° below zero to 200° F.
2. Effective expansion identical with ferrous cylinder.
3. Steel tension member, with same effective expansion as cylinder, maintains uniform skirt clearance through entire temperature range.
4. Normal diametric clearance usually less than .001 with uniform skirt bearing.
5. Durability and conductivity comparable to heavy duty design.

*T.M. Reg. Pat. App. For

ADVANCED ENGINEERING

PRECISION PRODUCTION

COOPERATION with Engine Builders

ZOLLNER PISTONS

THE ORIGINAL EQUIPMENT PISTONS

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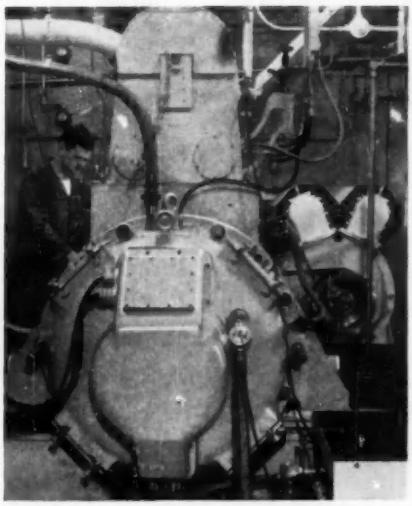
ACTS



Test stand for running jet engine ball bearings at high speeds, high temperatures under heavily loaded conditions.

RCH NEVER STOPS!

Tomorrow's needs are today's concern at the aircraft ball bearing research facilities at New Departure. For, the future development of the ball bearing will be closely identified with future engine design trends. This means New Departure spares no effort in developing bearings to operate at higher speeds, heavier loads, and under higher temperatures with good bearing-life predictability.

As always, New Departure keeps pace with changing conditions in the industry. For New Departure's design and fabrication processes for current high-speed, high-temperature, heavily loaded ball bearings are major factors in the successful operation of today's jet engines, as well as auxiliary turbines and accessories.

For aircraft and accessory bearings, send for **CATALOG ABC.**

For data on research progress for jet engine bearings, send for **REPRINT JEB.**

EPARTURE

L MOTORS, BRISTOL, CONN.

NOTHING ROLLS LIKE A BALL